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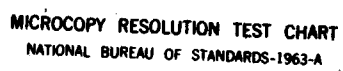
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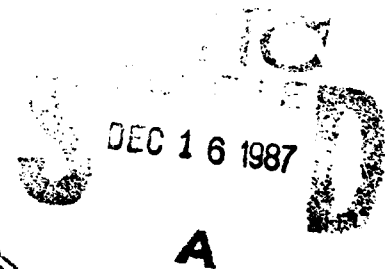
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 *A National Security Essay*

Strategics:
the logistics-strategy link

Kenneth N. Brown

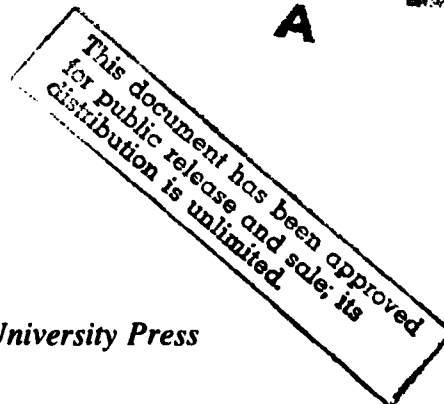


A National Security Essay

1987



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Foreword

Although strategists long have been aware of the intricate relationship between strategy and logistics, negative clichés about that relationship persist. We still hear, for example: "Strategists are the thinkers; logisticians, the doers." Or "Logistics merely carries out the strategic plan."

In this essay, Colonel Kenneth N. Brown, US Army, challenges the careless thinking that perpetuates such clichés. Convinced that strategy and logistics should never be studied independently of one another, Colonel Brown blends the two fields into a concept he labels *Strategics*—a concept which can be applied to military planning, force design, training, and tactics.

Colonel Brown's call to resist the tendency to study strategy and logistics in isolation from one another is a wise one. *Strategics* offers a sensible, pragmatic approach to the planning and conduct of military operations, especially in the increasingly vital world of joint operations.



BRADLEY C. HOSMER
Lieutenant General, US Air Force
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Prologue

Strategy and Logistics: An Inseparable Pair

This essay aspires, most of all, to prompt serious thinking about logistics and the nature of the relationship of logistics to strategy. An article on the National War College in *The Washington Post Magazine*, November 4, 1984, notes that

The [National War] College is supposed to teach strategy to 'The thinkers' . . . and the Industrial College [of the Armed Forces] is supposed to teach logistics to the nuts-and-bolts types.

This statement reveals two symptoms of shallow thinking about logistics. First, people who study logistics are matter-of-fact, practical folks who are not "thinkers." The implication seems to be that logisticians are bureaucrats, drudges who operate a rather mechanical system that somehow produces something called logistics. The second symptom is worse because it raises the fundamental question of intellectual worthiness. Is the study of logistics worthy enough to attract "The Thinkers?"

The implication is that "thinkers" studying strategy shun or even scorn the unstimulating "nuts-and-bolts types." I see no malice in this view—just the unfounded notion that any study of logistics is, by definition, plodding, dreary, technical, and unimaginative. Of course, such an attitude is dangerous in that it assumes that crises are met and wars are

fought by elite strategists and that logisticians are uncomfortable, unwelcome meddlers in all but the most mundane aspects of policy strategy.

Logistics commonly is associated with the tail of the metaphorical beast that represents the forces with which we wage war. Furthermore, the tooth-to-tail comparison usually contends that more teeth and less tail always makes for a better "fighting animal."

Nevertheless, most military professionals, over time, come to realize that the *stuff* of war indeed is as important as the strategy of warfighting. Having what is needed cannot be presumed. No strategy can save a campaign when the "stuff" is lacking.

In general, when either strategy or logistics has precedence over the other at a given command or decision level and a reversal of precedence is possible at the next level, there will be problems on the battlefield. In other words, operational and tactical actions may become dependent on the next higher level's allocation of logistic resources. In warfare, the existence of such a potential has become axiomatic. We must begin to explore seriously the thought that logistics is as important to any great wartime enterprise as strategy. As a convenience for this undertaking, let us coin the term STRATEGICS to identify the field that blends strategy and logistics. With this view, we can begin to apply resources to warfare with a new sense of purpose and a new recognition that modern war must not be left to cleverness, courage, and luck.

By *strategics*, I mean the technique of using large military forces to render an enemy incapable of waging war, extending beyond the definition of strategy alone and integrating strategic and logistic studies into a new discipline.

I begin this essay with a plea for thinking, for seeing beyond the separate stereotypes we label strategy and logistics. Nothing in what follows has a pat answer. I have no *a priori* solutions, only an appeal for clear thinking and common sense. Let me raise two crucial questions:

- Can the concept of *responsiveness* link strategy and logistics?
- Are strategy and logistics equivalent?

The Nature of "Strategics"

Links Between Strategy and Logistics

Logistics, strategy, and tactics form three major branches of military art and science. Both logistics and strategy help to establish objectives, policies, and plans ranging over a variety of levels of activity—from ethereal to concrete. Although a certain degree of executing plans, implementing policies, and using materiel characterizes all three of these branches, the third branch, the tactical, is for the most part associated with actual "doing." This view does not mean that strategy and logistics are impractical by nature—for the exact opposite is true. Nevertheless, strategy and logistics must proceed together as preparatory concepts and activities to create viable tactical packages. Strategy and logistics are essential for planned tactics.

Unfortunately the bond between strategy and logistics has long been overlooked. Histories of war, for instance, have slighted logistics in favor of accounts of tactics and strategy. The ratio of writing about these "more exciting" aspects of war probably is greater than a hundred to one.¹ Even Dr. Martin van Creveld's history of logistics for the modern era concludes that *moral* strength remains more important than physical assets, at least by Napoleon's classification of three to one.²

History does suggest some important things about the relationship of logistics to strategy and victory, but these

suggestions remain unexplored. For example, where both France and Germany failed in invasions of Russia, the paintings and photographs of freezing armies stalled by winter often serve as examples of how logistics can be the deciding factor in a campaign. But I think that these examples are representative less of logistical failures than they are of the piling on of bad fortune. Clausewitz called the impact of uncertainty the "friction of war," and Napoleon and Hitler may well have been victims of tremendous build-ups of friction. Unquestionably, the variables that could significantly affect the friction of war were on the rise.

Sometime during World War I, a watershed developed to separate the streams of traditional and modern warfare, drastically and irreversibly altering the dimensions and parameters of strategy and logistics.³ Before WWI, men, aided by horses and small cannon, fought wars. Victory came by wounding and killing people and by destroying formations of people, mounted or on foot. But the Great War brought with it great machines and the need to destroy great machines to earn victory. Because it takes more explosive power to destroy a machine than to stop a man or a horse, logistics had to move more ammunition. Logistics also had to provide new services, such as fuel supply and equipment maintenance. The most significant new dimension imposed by technology was a loss of commonality with the enemy and civilian sources of support. Armies adopted weapons of calibers unique to their forces; vehicles and artillery were nationally peculiar. Although men could eat whatever food they might find while foraging, thousands of soldiers became the servants of machines; this step essentially divides warfare into two eras—pre-technology and modern.

When armies were small, individual soldiers were expected to be self-sufficient. Roman cavalymen, for example, provided their own horses. Over the centuries, even as armies grew and campaigns lengthened, self-provision from local

sources remained the general rule. When standing armies came on the scene, supply centers developed, and such centers began to provide support to armies for their subordinate groups. Thus, individual and small-group foraging gave way partially to the logistics "tail." Over time, soldier-centered resourcefulness shifted to a supply-oriented system in which the soldier became dependent upon a supply system instead of his own resourcefulness. Further, as armies shifted from extemporaneous to standing, preparation for their support became prudent. New considerations such as the location of stockages impinged upon questions of strategy. Care and management of stockages, of course, added more to the proverbial "tail."

Related partly to the location of stock centers is the means of transport. Gradually, these means have shifted from beasts of burden to wagons, to trucks, and to aircraft. Each innovation increased the contribution to tactical support but also added new requirements for logistical support. The greatest impact was to increase the speed and distance dimensions of the battlefield.

Through the changes marking the historical progress of logistics, one theme runs: the pressure of specialization has increased the interdependence of elements of military forces. This trend is consistent with society's ever-increasing division of labor, moving farther and farther away from self-reliance. Today's fighting soldiers need all manner of specialized, high-technology support for their weapons and their persons. No one provides his own horse anymore! Forward defense with attendant prepositioned materiel is now a principle of both strategy and logistics, and units regularly carry substantial predetermined stocks with them on deployment. But most commanders assume that further logistical support from the "tail" is available. Furthermore, armies are now dependent on transportation networks and their attendant infrastructures. This ever-increasing specialization perhaps

has created the current squabble about whether commanders should "lead" or "manage."

Thus, our technological age produces two indisputable trends that seem to feed each other:

- We have moved into the era of technology-driven machine warfare. Only in extreme moments will the individual warrior ever again play a pivotal role.

- The more technologically dependent we become the more we move away from self-reliance and individual resourcefulness. Ironically, though, successful technology has brought complacency with it and with complacency have come arguments to reduce the "tail," while somehow assuming that the level of support will stay the same.

Trends in logistics mentioned to this point are, admittedly, general. Specific counters are all too easy and too simple to find. Some proposals, for instance, call for armored maintenance vehicles and other refit or resupply vehicles that can "keep up" with combat forces, feed-on-the-move field kitchens, and containerized hospitals. Though these ideas may seem good to the support provider and receiver, they also increase dependency on specialized equipment or methods. Furthermore, ever-increasing specialization demands an ever-increasing share of our national resources. Whether any country will commit to dedicating a larger and larger portion of its available resources to increased specialization is doubtful. Necessarily, then, counters to the major trends in logistics introduce two drawbacks of their own. As an option, if specialization is not available, how do we compensate? If specialization is available, but national will sides against committing the resources needed to bring it about, how do we compensate?

One way to offset such limits is to blend strategy and logistics formally in a new way that allows for synergism—

geometric or even exponential multiplication of strategy and logistics one by the other. This ability of the one to respond to the other, a concept I call **RESPONSIVENESS**, is the linking factor in the theory of strategics.

I stress *unity* in strategy and logistics because this goal for the relationship is becoming more critical. Peacetime strategics tend to set the "limit" of resources at a less than acceptable level. This disparity results from the failure to understand that strategy and logistics exist as aspects of military capability, as branches of military arts and sciences. Just as a human marriage is more than a simple partnership in its quest for unity, so, potentially, is the strategy-logistics marriage. The bond cannot be easily measured or quantified in a mathematical sense, such as the $E = mc^2$ equation of bonding famous in the theory of physical relativity. That fact notwithstanding, strategy and logistics must draw on one another to best prepare for and fight wars.

The principal manifestation of warfare—or portrayal of its physical essence—is logistics. Consider the formations of people and rows of equipment in a parade. A systematic series of functions and processes provides the people and implements of war: recruiting, training, administering, distributing, servicing, maintaining, providing, resupplying, studying, developing, acquiring, repairing, policing, governing, transporting, and so on. It goes without saying, tremendous potential resides in this mass.

A dynamic component also can be found in logistics. In fact, in peacetime the major motion of the body of war capability is in the logistics realm. Servicing equipment, training within doctrine, and exercising plans all prepare for the physical aspects of war. Admit it or not, this amalgamation of effort is logistical in nature in almost every respect. Thus much of the peacetime kinetics of war belongs to logistics.

The bonding factor between strategy and logistics—the synergistic catalyst—should be what I call *responsiveness*.

We begin to assign a suitable meaning to responsiveness by considering that strategy best manifests itself through a capacity for action. People and equipment are the two substantial parts of that manifestation. Morale, will, and esprit breathe life into strategy or, as Napoleon put it, are the moral contribution to success in war. Again I emphasize he rated these contributors three times more important than other factors.⁴ But will cannot prevail without sufficient backing in substance.⁵

Stated in slightly different terms, strategic success will be proportional to logistics in the very degree to which logistics responds to the need. There is a proportional relationship between the two: knowing one and the factor which relate the two determines the other. I argue the factor that must relate strategy and logistics is responsiveness. Through responsiveness, strategy converts to logistics, and logistics converts to strategy. Neither responds without the other being present—strategy equals logistics multiplied by responsiveness.

How do I see responsiveness at work? Here is a practical example of what I mean by the responsiveness factor:

Suppose a fuel pump needs replacing. *Failure* seems likely from poor engine performance; *diagnosis* checks electrical and pressure responses; *analysis* determines that a new pump should fix the problem; and *repair* removes the old and installs the new pump. Responsive maintenance prognostics must involve the entire piece of equipment, going well beyond the specific repair to look at the mission profile that will occur after the item leaves the repair shop. Prognostics should examine as a minimum the entire fuel system: hoses, connections, valves, and meters. Will restored levels of correct pressure cause leaks in older, weakened fuel lines?

Responsive maintenance is, thus, more than just fixing things. It links eventually to strategy because, as in this example, it takes the long view: it attempts to restore equipment to its intended purpose for the longest time possible.

Continuing and expanding this example, I explore a broader question: How can the function of maintenance, even as a part of the logistics system, be related in any specific sense to strategy? Maintenance is a "mundane," but essential activity. Things break and must be fixed or replaced.

Strategy, on the other hand, is the sweeping conception of war—the how, where, and when of warfare. The link between strategy and logistics emerges by imagining answers to the how, where, and when as related to the numbers and kinds of people and materiel required—the things that can break or fail.

Let us suppose that under the strategic concept of protecting global interests with forward defense, we seek to provide a certain level of light armored vehicle support to one force package deployed in Southwest Asia, support designed into the deployed force within a maneuver-style warfighting concept.⁶ Strategic concepts within this style of warfare require deployment of light, mobile forces to theaters where large sophisticated enemy formations either are not expected or where they can be fragmented by air interdiction of enemy routes of advance.

Deployment *capabilities* plus the *distance* from North America make unlikely the delivery of large numbers of backup armored vehicles. Worldwide inventories of such light armored vehicles may be an even more important constraint. If the maneuver style of warfare is the goal, then a forward defense strategy apparently creates the need for responsive maintenance of the vehicles deployed. In other words, we must use fully what we have where it is. If

on-hand items break down, they must be repaired because there is no recourse to a depot full of replacement vehicles. Even if such a depot did exist, the operational-level time and distance factors associated with maneuver concepts rule out replacement. Responsive maintenance must repair and, as in the example of the fuel pump, must take all feasible actions to ensure that the repairs sustain operations for as long as possible.

The example here is less a forced fit than it appears. It is a derived construct that meshes strategy and logistics. At first, to the strategist it appears unattractive because it seems to make strategy too dependent on maintenance. But accepting this link is critical—if not in the case made here, then at least in principle.

Planning maintenance policies has many variables. The way equipment is designed to be maintained is an important one. But in development, the extent to which mission requirements stress equipment is more critical to maintainers. Equipment that must operate at or near its design limit—the proverbial red line—fails more often and more drastically than equipment treated less harshly. Unfriendly and unforgiving designs are a serious problem for maintainers. Where maintenance is done and who does it are also important maintenance questions. I propose that all answers to questions such as these should revolve about the factor of responsiveness of the maintenance scheme to the strategically generated need. I suggest that such a viewpoint develops maintenance answers that create a potential (strategy-related) that enhances the utility of resources for maintenance.

Does responsiveness as the framework of thought provide an insight useful in determining the maintenance support concept? The need is to retain mobility and to keep on-hand equipment operating. To be responsive, the maintenance concept must contribute to self-sufficiency of the using

unit. Maintenance questions ought to be answered on the basis of this criterion. Certainly, we need to consider the increased burden of parts, tools, and skills. But the addition of capability must not be dismissed just because it carries some baggage with it. On-site user maintenance can work if properly provisioned and provides the additional capacity to return equipment to intended use as soon as possible. Of course, equipment designs must accommodate this concept.

I do not intend to present a complete force design for my ideas, but certainly such a design is possible. Some specific principles of design I will put forth later. At this point of my argument, though, I see as most important, stressing how responsiveness links strategy and logistics and drives us to a self-sufficiency approach. Self-sufficiency comes from self-reliance. Self-reliance, I feel, enhances the concept of forward defense and the maneuver style of warfare. A maintenance concept driven to the limit of self-sufficiency reduces in the operating unit dependence on outside repair assistance, bolstering the unit's ability to take care of its needs more generally. Self-confidence and self-reliance result. Self-reliant maintenance enhances the capacity of the unit to take part in strategic plans by increasing the possibility for *independent* action by genuinely complete force modules. This capacity will contribute to the ability of political decision-makers to tailor and to limit application of forces to appropriate levels.

Responsiveness

The Utility of Linkage

Thus far I have discussed responsiveness as the link between logistics and strategy. I also suggest that responsiveness can measure merit and be a "tangible" part of a strategy-responsiveness-logistics model. Under my integrated viewpoint of strategics, we can measure mutual responsiveness—not necessarily numerically, but certainly conceptually.

If, for example, we were to choose a strategy under which we protect our interests by forward defense in a variety of locations, then we might design a logistics system by testing its responsiveness in given scenarios of deployment. Such a system might employ prepositioned stocks of ammunition aboard several large ships anchored in friendly ports throughout the world. If we build these ships to maximize storage capacity, we restrict ourselves to deep-water ports. As we measure responsiveness, we likely will find locations that cannot accept these ships, because the adjacent waters are too shallow. So, what initially appears to be a good and proper logistics idea based on efficiency of ship design, does not respond to the strategy. Because some locations merit our interests but lack deep-water ports, the strategy would not be completely executable.

As with any link, the key to gaining the most meaning and value from responsiveness comes from establishing and

maintaining continuous and secure connections among linked entities. Understanding how to find the connection—or how to define it in more concrete terms—may emerge from applying responsiveness, the foundation of strategics, to the creation processes for military capabilities.

The criterion for merit generates a theme under which processes develop and operate. If the theme is economy, then the processes will focus on frugality. If the theme is efficiency, processes generate “cost-effective solutions.” Other themes breed other characteristics, but in all cases, the theme tends to concentrate exclusively on one characteristic value, thereby limiting other desirable results of a process. The responsiveness theme is the only one that allows other themes to gain significant recognition. It is, by nature, flexible and tolerant.

Responsiveness, as a theme, strives to sense real need. Responsiveness thus creates the environment for synthesis, the building approach. Other themes, when applied to the process, tend to force analysis, tearing apart and dissecting a process to find out where to apply the theme for maximum benefit. Cost-effectiveness rationales are the most analytical in their themes, tending to give minimum consideration to human nature. Efficiency tends to seek high output-to-input ratios by optimizing each step in a process. Step-by-step approaches necessarily forget the end product and the customer. As we examine the set of processes selected here, almost certainly others come to mind. The utility of the responsiveness factor, however, should be the same, if we apply it, using the following principles:

- Orientation on the end product and customer.
- Tolerance for other measures.
- Emphasis on synthesis instead of analysis.

Force Development

Military forces result from a process called "force development." This process unifies those activities generated from a doctrinal idea and aims to deploy a complete package of doctrine, organization, and equipment. A legitimate question is which comes first, doctrine or materiel? In *The Influence of Sea Power*, Admiral Alfred Thayer Mahan wrote:

Progress of mankind causes continual change in weapons; and with that must come a continual change in the manner of fighting. . . . Changes in tactics have not only taken place after changes in weapons, which is necessarily the case, but . . . the interval between such changes has been unduly long. This doubtless arises from the fact that an improvement in weapons is due to the energy of [a few] men while changes in tactics have to overcome the inertia of a conservative [larger group]. . . . It can be remedied only by a candid recognition of each change by careful study of the . . . weapon, and by a consequent adaptation of the method of using it to the qualities it possesses. . . . History shows it is vain to hope that military men generally will be at pains to do this, but that the one who does will go into battle with a great advantage—a lesson in itself of no mean value.⁷

Mahan, the most highly regarded American strategist, suggests that technical ideas precede the ideas for applying them and that materiel precedes doctrine. I propose that Mahan's statement offers a clear mandate for quicker and better application of all advancements in the arts and sciences to improve military capability since Mahan suggests the need for better integration of ideas, an argument that fits well into the concept of strategics. No matter which comes first—doctrine or materiel, strategy or logistics—they must be linked by mutual responsiveness.

The most critical implication for force development is the early comprehension of support needs—the logistical

dimensions of a force package (organization, doctrine, and equipment). This comprehension includes more than the perennial plea for greater investment in logistical support design and early, serious attention to developing support methods. Accepting the responsiveness theme will mean that force developers must address the total performance requirements of the mission as they formulate and document new concepts for doctrine, organizations, and materiel systems. Mission profiles must include support aspects of unit operations, and these aspects must rank equally with the more typical performance requirements. The range of a vehicle or its operating radius is a typical performance requirement that has several total mission profile aspects. Doctrinal needs, based on a combat mission, can be used to determine range. Human performance and endurance also should be considerations. Fuel capacity and weight have their impact. These last two sets of criteria have obvious relationships to logistics. Responsiveness adds to the determination of this range requirement, to the more comprehensive need for continuing mission accomplishment, and to the impact of the range on all aspects of materiel and human support.

Total mission responsiveness includes considering on-the-move repair and associated human skills and maintenance equipment needs. Also critical would be the time to return to a support base, together with refurbishment supplies of food, fuel, and armament needed at the support base. Logistical planners rarely consider support base skills and unit organizations when establishing combat radius performance requirements. But this support "tail" determines the ability of the combat force to continue its mission. By addressing the total mission profile, we should begin to see how to create a logistics capability responsive to the overall combat need. That need includes such support aspects of the combat system as time to refit, provision, or refuel. It is not too early to conclude that, under most conditions, logistics responsiveness will enhance the effectiveness of a combat system.

Strategics, thus, becomes a foundation for this general process of force development. Logistics impacts are given better consideration. The result will be improved satisfaction of the military capability requirement based on strategy.

Logistics Research and Engineering

Force development as a process has been described here as all-inclusive. It forms the process that creates and deploys forces by combining doctrine and organization with more classical research and development. This process applies to field logistics units just as it does to the combat force. Frequent, lively debate on how independent this process application should be will ensure that the responsiveness factor survives. I can imagine no case in which logistics support should be developed on a basis of support efficiency or, worse, on support convenience: two approaches that hamper goal orientation. Will it be possible then, realistically, to devote generic research and engineering to logistics while avoiding a tail-wagging-beast result?

Opportunities certainly exist for specific technical and doctrinal improvement in the various functions of logistics. Using responsiveness as a theme, these efforts are likely to become well-defined realities, especially when we have more strategics practitioners. More important will be the research to integrate development needs springing from total mission profiles since if this requirement is not recognized, we could find ourselves in an ever-increasing tangle of "individualized" systems. There will be no alternative: logistics research and engineering must develop a new logistics process of integration within the force development framework that seeks out the results of mission profile force developments. As an application of the strategics principle, this process will analyze the aggregate requirements to synthesize, build, and integrate an overall support system.

Establishing this new integration goal for generic logistic research and development departs from currently accepted precepts of logistic system planning. Some planners regularly use the dogma of standardization and efficiency as an excuse for precluding imaginative force development of logistic support. Economy will always have a place in logistics. Nevertheless, I must question historically-based functional approaches, such as dividing maintenance responsibilities among echelons of increased skill and complexity and risking insupportableness in the maneuver style of warfare. In like vein, standardization tends to support development of equipment that concentrates service at these specific levels or echelons. How well can this self-generated need for backup support be applied to the maneuver style of warfare? Could a generic logistics development of a single multipurpose printed circuit board create a need or desire for a single test and repair point? Efficiency answers this question—yes. But how do we get the circuit board to and from the customer on a dispersed, fluid battlefield? The answer needs to be developed in an environment of responsiveness rather than generic research, which looks at logistics for logistics purposes only and is, from the responsiveness point of view, suspect.

More important, it seems to me, is applying technological advancements and management improvements in a tailorable matrix of functions. The matrix system for applying resources is a mark of excellence.⁸ Responsive logistics should lead us to define the matrix and manipulate it, thus providing a source of knowledge and potential for cross-fertilization. Once this matrix is developed, we can, of course, expect to discover voids. These voids are candidates for the application of the force development process to specific support requirements with the clear objective of a better integrated and flexible support system responsive to the combat force.

Production and Training

Up to this point we have discussed the implication of responsiveness in the broadest context of strategics, because processes that create military capabilities always must consider people, ideas, and materiel. At this point, I will separate these considerations to discuss the application of responsiveness to the processes that "produce" hardware and "train" people who operate that hardware.

In what follows, production is presented as the process that gives us hardware. Training is another process that gives us skilled people—as individuals, as crews, and, ultimately, as large organizations. Training is treated second only because it is affected by the responsiveness factor in a more encompassing way. People are subject to sensitivities and perceptions, both of which are good vehicles for esprit enhancement, which the responsiveness factor allows us to explore.

Production

Manufacturing aims to produce components or pieces of equipment efficiently. Productivity and quality currently top the priority list for the process—and they should continue to do so. High-quality, reliable hardware is the key to a responsive support system, because such hardware fosters certainty and predictability of performance. To a great extent, reliability results from quality assurance, which in turn is part of modern industrial engineering. Productivity and quality are nothing new. But though necessary as a base for any support concept, they are not alone sufficient.

In general, production lines are set up to manufacture equipment. These lines represent the meaning of the concept of a process as much as any group of actions. Production planning and management orient on the product. Production processes, by owing their existence to the end product,

operate only as long as a need for new products exists. On this point, the responsiveness theme has its impact. To be totally responsive, production lines somehow must "live" for the entire life of the product, rather than only for the period of time needed to manufacture the number of end products for which orders exist. The measure for sufficiency now changes to how well a production process meets the life cycle needs of the product. A responsive support system is served well by a production process that can be used in continued support of the deployed military system. How this is to be done must be considered when the production line is planned and may well be included in production contracts. The contribution of "responsiveness" is the addition of life cycle support as a production engineering consideration. Specific impacts accrue to the functional areas of repair and rebuilding and in the supply of repair parts. For these functions, the objective will be to ensure that repairs and repair parts meet end-item needs. In terms of total system responsiveness, the following two benefits seem likely:

- First, use of "production quality" parts ought to increase the first-time success rate at all levels of maintenance, reducing maintenance downtime. This use makes the maintenance system more responsive in time.

- Second, since repair errors are less likely—because defective parts and improper configuration tolerances are less frequent—lower stock levels of parts and perhaps less test equipment will be needed. Thus, lighter, smaller maintenance "tails" result.

"Responsive" conditions combine basic, consistent, high-quality (necessity), and production engineering for life-cycle support (sufficiency). Sufficiency stems from the long-term continued use of the product and results from the contribution of the responsiveness measure of merit.

Training

If equipment comes from the production process, then skilled people come from the training process. Responsiveness has some simple and practical implications for this process. Searching for excellence through simplicity enjoys more vigor today than during all the first three decades after 1945.⁹ We often hear the argument that our technological explosion has "forced" us to simplify through specialization, but in doing so, we have accepted compartmentalized knowledge, divorcing ourselves from the sense of individual responsibility and involvement with the materiel and procedural systems. Loss of responsibility and involvement also extends to training personnel.

For example, we have assumed as precepts two unfortunate assertions: people are dull and irresponsible, and they do not and should not care about knowing more than their duties require. The simple points are obvious—people are not stupid, and people do care. Teaching people about equipment and procedures forms the foundation for the effectiveness of people-procedure-equipment systems.

These confidence-building loops represent the essence of strategics and the responsiveness concept. Responsive support implies an important new requirement—involvement—for the training process. We must teach people enough of the details of their doctrine, procedures, and equipment so that they can use and understand them. Equipment, procedures, and doctrine no longer are simple—but neither are people simpletons. The modern model of the man-machine system must incorporate this *simple* truth! The content of training and the training process must involve operators totally in their systems. In great measure, operators synchronized with equipment, doctrines, and procedures understand what their influence *can be*. Human involvement, through knowledge, increases responsiveness to routine situations, opportunities, and exigencies.

Again, I turn to equipment maintenance for an example. We should train operators and crews in enough detail so that they—understanding fully the outcome of working around problems, such as running under overload conditions or shorting out fuses—might discover still more ways to bypass failures. Among the benefits, we should expect to see some level of operation even with failed equipment. Furthermore, crews would know how to evaluate and predict the level of performance of partially failed equipment, increasing confidence in their ability to continue to operate and contribute to the mission at hand. I will be dealing with this concept of attitude creation, called “involvement training,” in the next chapter. With a small investment of time, we can reap the benefits of the responsiveness theme in training. Application possibilities are not limited to new systems; a substantial immediate benefit for current generation equipment is readily available.

Operational Level Logistics

The operational level encompasses the support of deployed forces on the scale of an Army corps. Operational logistics involves the zone of transition from “wholesale” to “retail” support.¹⁰ Managing this transition forms the focus of responsiveness thinking at the operational level. Because the latest landpower doctrine provides time and distance zones of responsibility to the various levels of command, responsiveness must become the byword for logistics support planning, much more than a mere requirement.¹¹ Responsiveness is a linking factor and measure of merit, a way of thinking that stimulates answers to both the “how” and the “why” questions. Operational level support has sufficient resource allocation authority and flexibility to plan for responsiveness.

Not unlike the effect of responsiveness on force development, I see responsiveness leading us to improve the

integration and synchronization of logistics functions. Although system materiel design along with doctrine and organization will incorporate technological improvements, the functions will remain mostly the same. What should not remain unchanged is the current tendency to think in terms of functionally oriented logistics systems—maintenance, supply, transportation, administration, construction, and so forth.

As one example, at the operational level, a need seems to exist for a new function called distribution, which combines transportation, supply, and facilities management. This distribution function would provide the right things, to the right places, over the most expeditious routes, using the least number of vehicles and facilities. The operational level, as it breaks the wholesale system out to the retail, is the appropriate level for implementing this type of functional realignment. Because substantial costs and extensive procedural changes are likely to be involved, I leave details on the distribution function for the chapter entitled "Far Future Goals."

Applying responsiveness at the operational level suggests that functional realignments can be extended to the whole question of the technical control process. Logistics must develop a method to centralize direction and control. Support commanders also must develop their "own" intelligence system to combine the knowledge of supported force intentions with information of both friendly and enemy support resources. Within the same time and distance area as the supported commander, logistical operational planners must respond with a tailored support scheme.

Technical control will capitalize on and use available resources by exploiting the functional systems (maintenance, supply, ammunition, and so forth) through synchronization with supported force battle plans and needs. Another

requirement is the need to create the control system for exploitation of opportunities, especially for logistics operations that will reconstitute units. This aspect involves all the mechanisms of the infrastructure of support and represents a challenge to combine the remnants of decimated units with input refurbishment resources to reconstitute effective fighting forces. The combination of the logistics intelligence net, wholesale interface, and technical control places the reconstitution mission clearly at the operational level. Reconstitution is a new requirement that will come about because of mass destruction from nuclear weapons or concentrated conventional weapons, or because units have operated away from support for long periods. Responsiveness plays a key role in defining both the need for and combination of old functions to meet this new reconstitution mission.

Tactical Level Logistics

Tactical level logistics takes place, for example, at the Army division level. Since all units need this level of retail support, tactical logistics must take place throughout the theater. The key to responsiveness at this "working level" already has been introduced in the discussion on training: the idea of involvement. Better knowledge of how support works leads to establishing realistic requirements.¹² Combat elements should carry only what they need and what they should have. Then, discipline and self-confidence will control the temptation to carry an extra amount of fuel, food, or whatever.

Another area dependent on tactical level actions will be the gathering of information on enemy logistical resources. Awareness that all can and should be involved in support is an important but not widely held idea. In addition, tactical level support and combat commanders must provide information on what friendly resources are available for reconstitution actions. With such an emphasis on information, the need

for automation and communications at the tactical level for logistical units becomes imperative. Again, the concept of getting everyone involved—allowing everyone to be involved through doctrine and equipment—emerges as essential. Involvement will be expensive in the initial design of new equipment; but to gain responsiveness, the expense is necessary.

The Overall Process

All of what is done within military art and science to create and support the use of forces we might really call logistics. In this context, logistics is the entire set of activities that generate military capability. Though we have briefly discussed a very small sample of the contributing processes, we have not addressed the overall process. The product of the logistic processes is a strong infrastructure that can respond to strategy considerations to serve the combat mission. Efficiency and cost-effectiveness are relatively easy to measure and can make the logistician look good on his own terms—short-tons moved per man, dollars per repair, gallon-miles per tank truck, and the like. But these sorts of measures account poorly for isolated units or for spread-out forces. Strategists and logisticians (and those who practice strategics—strategicians) must assess how well support materiel and procedure systems can fulfill their purpose in a more dynamic and more widespread battlefield. Mission and customer interests that require greater flexibility and involve more uncertainty will have to be the strategist's dominant concern. This concern, a mark of potential for excellence, is a manifestation of the responsiveness theme.¹³

The next two sections treat some near-term and longer-term recommendations. These ideas result from the responsiveness theme and further develop the principle that responsiveness is not only a measure but also the link between strategy and logistics.

Immediate Utility

Recommendations for Present Action

Rightly, most people think that the defense budget is a plan for allocating money, but it is also a plan to allocate time. When there are not enough defense dollars to do what appears to be required, we assume either that the defense project can be completed over a longer period or that that project can be delayed until more money is available. We thus allocate an amount of the future to the requirement. The near future is the period during which we are willing, for any reason, to allocate and spend real money. The near future is the timeframe during which something will happen or at least is scheduled to happen. Immediate utility, therefore, is only practical if ideas can be implemented within the money-time constraints of our budgets. Priorities partly define the nearness of the future—and they may very well imply a willingness to spend or plan to spend a larger amount of money than would have been allocated to a lower priority.

So a natural relationship exists between time and money. We need not be preoccupied with firmly defining the near future as any set number of years, but some idea of what this term means will be illustrative. The normally accepted (current policy) programming period is five years beyond the fiscal year for which a specific budget is proposed. At any given point, appropriations extend through the current fiscal year (one year into the future). Meanwhile, the next budget is being proposed, accounting for another year into the future

plus five more years, which are "firmly programmed." "Firmly programmed" means that specific line entries in service program documents are prioritized into three categories: funded, marginal, and unfunded.

- "Funded" means that the program is assured money, if no dramatic economic policy change occurs—a sure thing.

- "Marginal" means that favorable politics could produce enough money to support the program, but the program is not assured.

- Unfunded means that a significant and unexpected change in priorities would be needed to gain enough money to support the program.

Any action or program beyond these seven years (one appropriated, one budgeted, and five programmed) definitely is in the far future. In addition, anything that falls into an unfunded program line in the five program years also is in the far future. Anything already paid for (appropriated) or firmly planned (budgeted for) is in the near future.

Implications of Lighter Land Forces

The notion that land forces are destined to become *lighter* grows out of the trend toward the maneuver style of warfare. The requirement to be *lighter* is based on the forward defense strategy with its attendant need for greater mobility.¹⁴ Why this requirement is closely attached to the strategy may not be obvious. After all, to be prepared for global warfare, many options are open. Traditional ones are:

- stationing forces in all places where national interests are open to any sort of potential threat;

- arranging for regional powers to act as our military agents either because of mutual interests or simply for material gain—we pay them to support our strategy; or

- projecting military power through naval presence or through airpower.

The option of stationing forces in all areas where interests might be threatened entails a huge commitment of resources. Even a casual study of force requirements of such deployments quickly exposes the idea as infeasible. Limiting the deployment to areas of critical interest doesn't improve the situation. The nation will not support the large standing force necessary, let alone the recurring bill for upkeep. Another argument against global deployment takes an incremental approach. No matter how many bases are proposed, someone always wants to add another, or if not another, wants to support an alternative priority. This mushrooming suggests "Murphy's Law, subparagraph three": no matter where we station forces, they will be needed somewhere else. Realistic planners must conclude that we never will be able to effect anything that approaches global deployment of landpower. One final point: deployment eliminates ambiguity, leaving no doubt about the intent to threaten the Soviet homeland and no doubt about where. Such a stance, in Soviet eyes, would probably constitute an offensive threat that would prompt response. All in all, global stationing seems unattractive.

Dependence on allies or agent states currently is part of American strategy and relies on mutual cooperation. In truth, US alliances generally fit this description, although the February 1985 disagreement about nuclear arms between the United States and New Zealand could signal an exception that proves the rule. Rumors of US threats of defense and economic sanctions because New Zealand would not allow port calls by nuclear-armed Navy ships did not support mutual cooperation. The option of depending on military alliances is based on the continuity of support by other sovereign nations and relies not upon pressure but rather upon a perception of mutual interest. If we must resort to

threats, we force cooperation—undesirable and unacceptable behavior between “allies.” There is no way to guarantee the support of allies exists. I do not argue against using alliances and agent states as part of a cooperative defense; I only point out that, as a principal option, this approach cannot be the keystone of a national strategy.

The third option, favoring a strategy that projects force from the seas and from the air, fails to place people on the ground in the area we choose to protect, to influence, or to threaten. By nature, maritime and air-launched power essentially are transient. Although their impact may be tremendous, their staying power is less impressive. The overwhelming effect of these forces in a low-intensity environment appears absurd, and the forces’ overkill of fire-power-intensive methods even can be ineffective—as they were in Lebanon in 1983–84.

The inability or the unwillingness to deploy landpower often masks a lack of staying power. Any option that excludes the use of landpower—whatever the reason—seems shortsighted. To avoid extended debate on fundamental issues beyond the scope of this essay, let us accept the need to prove our will and our staying power in any engagement. Such will and staying power are associated with landpower. Lightened forces may indeed be a foundation for a fourth option.

Light forces carry with them many desirable features, even in a static, defensive environment. The general benefit of light forces is, of course, a reduction of materiel needs. If nothing else, fuel requirements drop. Light forces ought also to require less mass transportation when they move and less ammunition when they fight because of the emphasis on the surgical use of firepower (as opposed to its massive use). The fundamental concept is to apply forces quickly where they best disrupt enemy unit and organizational integrity. By

destroying the capacity of the larger force to operate in a coordinated way, light forces effect defeat.¹⁵ While this discussion is not intended to be a defense of light forces, maneuver style, or global forward defense, agreement that these concepts are mutually supporting and theoretically synchronized is important. Given such agreement, we can employ the concepts of strategics and the responsiveness factor to develop some specific recommendations for light force logistics.

The US Army is designing and fielding lightened forces.¹⁶ Organizations for a light infantry division are well-developed and already implemented. Lightening of the larger, heavier-armored, and mechanized divisions also is under study. At present, the principal method of meeting support needs is to assign them to a higher level of command, above the division. The movement of responsibility for backup maintenance, for stock beyond a few days of supply, for administrative support, and for other needs amounts to a "passback" of requirements. The philosophy appears to be that, to lighten any given organization, you should reduce internal capability, and assume that some other element of the larger force will provide this internal capability. To the extent that such action reflects the wise reduction of requirements, it appears justifiable. But when the requirement is passed back, a dangerous "out-of-sight, out-of-mind" philosophy has a chance to take root.

An example of a "good" passback would be the movement of most personnel administration out of the deployed division. Pay, promotion, awards, and other such support need not be proximate if good communications are available. Soldiers would need assurance that the support was being provided, however, and that their welfare was being looked after. With continued emphasis on excellence in personnel support centers, such a confidence level can become routine.

On the other hand, maintenance offers an example of bad passback of support responsibility. The increased complexity of equipment and the associated need for sophisticated maintenance equipment and specialized skills of mechanics amplify the problem. Current design trends seem to preclude any complete solution to this problem. Whether there is an alternative to evacuating failed and damaged equipment to the rear is not the central issue. But relying *increasingly* on higher levels of support for all but simple repairs is a fundamentally bad concept and inconsistent with speedy restoration of equipment readiness. I have suggested that defining the comprehensive mission carefully during the force development process will lead to better design. But the reality of applying this suggestion remains far in the future and will be expensive. Can responsiveness suggest some links that are practical, do not cost money, and generate synergistic benefits for logistics-strategy?

Logistics Campaign Planning

One answer is in improved logistics planning: for instance, developing and completing *logistics campaign plans*. Two key considerations lead to a focus on this particular type of plan.

First, the principle of logistics passback applies between the division and the next higher level, the corps. The border between division and corps coincides with and helps define the tactical and operational levels of effort and thought. More than convenient, this stipulation defines a significant change of time and distance viewpoint, of resources at hand, and of scope of enterprise. In particular, the operational level of corps has much more flexibility than that of division, because it is not in direct contact with the enemy. A *second* but not necessarily subordinate consideration is that campaigns are planned at the operational level. Campaigns are much less abstract than strategy, developed and performed at the

national level and guided by broader policies and long-range objectives.

At the corps level, logistics planning aligns with specific theater-oriented operational plans. A campaign plan is a very specific scheme for using forces in a well-defined manner. Campaign plans account for such things as terrain, location and size of both enemy and friendly forces, and warning time. The plan always must be practicable and readily executable, never based on some fictitious area of the world or set up for simulation or gaming purposes.

Though logistics plans should exist to support the various campaign plans, in fact, they do not, according to many senior Army officers. This judgment is based on a very specific charge by a very senior Army commander that the Army must produce such plans. I've heard this charge myself as recently as the late summer of 1984. I have personally found that logistics plans, most often annexes to operational plans, usually are "to be published," or are outdated, or are vague and ambiguous. I am confident that the logistics aspects of operational-level campaigns, when they receive proper attention, can result in practical and sound plans.

Recommendation: *As campaign plans develop, concurrently develop associated logistics plans. No corps chief of staff ought to say that a campaign plan is complete until the full logistics annex or logistics campaign plan is prepared.*

If the *heart* of this recommendation is to develop logistics campaign plans, then the *blood* that courses through it is to recognize the passback principle. This recognition should take the form of a time-sharing plan for the use of corps logistics resources. Plans must deal with an increase in responsibilities to accept requirements formerly allocated to the tactical level of support. Yet, little likelihood exists for more support units in the near future. The logistics campaign plan

must define requirements and what can be done, *within the limits of current doctrine*. Such basic work, associating specific needs and capacities at operational levels, is a substantial addition to current plans. Among other gains will be knowledge of the aggregate needs for any given set of campaigns.

Honest analysis is an absolute prerequisite for gaining any real value from the work. Neither unrealistic optimism nor over-cautious pessimism belong in the logistics campaign plan. While time-sharing of resources should make full use of the support force elements now programmed, what must be developed are the methods to shift support resources at the operational level. I doubt that current logistics command and control doctrine can deal with this problem. Regardless of what current missions say ought to be done or can be accomplished, the doctrines remain untested against specific operational-level plans.

Even more certain is that doctrine for corps-level logistics does not recognize the increasing need to use the pass-back principle that light divisions will generate. Developing logistics campaign plans will bring such recognition and with it an appreciation for the responsiveness factor and its impact.

Logistical thoroughness demands questioning the viability of each specific campaign plan so that when a plan seems impractical, we can make corrections. What we will likely find in unsynchronized plans are general nostrums for shifting support, and assertions that using time-shared instead of dedicated support will meet needs. Developing synchronized plans at the operational level, using responsiveness in a feedback loop, will demonstrate the oneness of the strategic and logistics thought processes. Further, developing the logistics campaign plan in response to specific needs of a given corps plan surely will reinforce the level of confidence

in that plan, since those who must execute the support will, for the first time, know that what they have promised they can also provide. This logistics confidence comes from the surer knowledge of specific needs and capabilities. The so-called "can do" attitude now will have a realistic foundation, absolutely critical when resources are limited. The mutual gains for combat planners and logistics planners in terms of the honesty and reality of their plans seem a nearly certain result. Mutual responsiveness is born out of singleness of effort.

To achieve the degree of planning detail and follow-on knowledge, I recommend that small, campaign-oriented support-planning groups be established and manned. I am most interested in these groups being associated with the logistics campaign planning, but I submit that such groups may be of similar benefit to other aspects (such as intelligence and artillery) of the supported campaign plan. The planning group proposed here would form a small cadre responsible for a specific logistics campaign. The groups would need functional experts in the personnel, materiel, and service areas along with some additional analytical support. No more than six people would be required for each campaign group which would be established at the three- or four-star level commands charged with the campaigns to be supported. Intimate knowledge of the campaign would be created within the group and sustained by its long-term, dedicated association with only one campaign. Members of such a group need not always be active duty personnel because Reserve and National Guard personnel easily could undertake such a task for the headquarters based in the United States. Dedication of planning effort and a nucleus of knowledge promise far more responsiveness to campaign needs than the fragmented attention given by logistics staffs to multiple plans.

Perhaps the major problem of my proposal would be to integrate the planning group into the corps-level headquarters

that ultimately might execute the plan since staff members would need to step aside gracefully in order to accommodate and exploit a specific planning group. Assurance that planned campaigns and a pool of knowledge to draw upon during actual implementation warrant overcoming this potential difficulty. If the efficacy of developing specific logistics campaign plans can be accepted, then forming a dedicated planning cadre seems to be a natural follow-on.

A relatively small number of people would be required to strengthen greatly the integration of strategy and logistics. My ideas—planning groups and logistics campaign plans that recognize the special needs of their supported forces and that incorporate the passback principle—result from applying the responsiveness factor to the use of light forces in a global, forward-defense strategy. The relationship of strategy to logistics, separate but linked by the strategics-based thinking process, creates an environment for synchronized plan development.

Active and Reserve Force Component Balance

Campaign planning, and perhaps logistics campaign planning, are well supported at high levels throughout the Army, but movement toward a better balance among mission areas and components is needed. Mission areas are the very broad categories of combat and support. Components of the force are both Active and Reserve, where Reserve includes the National Guard. Between mission areas and components I find a severe imbalance. In the Army, for example, logistics units dominate the Reserve quite out of proportion to their combat strength. Yet, in the active forces, logistics units are insufficiently represented for synchronized deployment of a balanced force.

Recommendation: To maintain a force and deployment mix that balances all mission area capacities, current ratios

of mission area to component should be examined. Organizations should be converted in mission area and component to achieve a balance in the ratios. The active duty combat mission areas likely will decrease, while authorized support units will increase. Conversely, Reserve combat units will increase, while support will decrease.

One reason for the creation of such a balance in components stems from an environmental perception argument which states that active support forces are more attuned to the immediate support requirements of active combat units because they would have helped to generate equipment on-hand in the active combat force. In general, their priorities for training and exercise experience will coincide with the supported active force—no disparagement of Reserve Components intended. Units with similar experience and from the same general environment naturally are attuned to each other.

Other factors certainly are useful in determining the component-to-mission-area ratio. Some of these factors, indeed, may have greater weight than strategics and the responsiveness factor. Maintaining the attractiveness of the components to potential recruits is important. The young men we need for the combat force may desire to join only the active component. And technical skills needed in the support force may belong to people who want to pursue civilian careers while serving in the Reserve force. Given that this kind of consideration may militate against the need for balanced ratios, room still exists for some adjustments, perhaps by seeking comparability in the authorized level of organization (ratio of authorized manning to required manning) among components and mission areas. Such comparability would create a similar level of manning in units that expect to deploy together, whether they are Active or Reserve. A Reserve support unit that had trained at the same percentage fill of personnel as the active unit it expects to support would stand a much better chance of being responsive because their training environment experiences would be comparable.

As my discussion suggests, the responsiveness link is devoid of any political or economic bias. This issue of balance can become clouded, however, because resources are limited, and many prefer skeleton units to no unit at all. One legitimate yet unanswered question persists: how can a unit, which may have 60 percent of its doctrinal strength during training over a period of years (in peacetime), develop the appropriate appreciation for that doctrine? Even if the unit is filled to the full level of authorized doctrinal strength when alerted for deployment and then is given 90 days to train, how can that unit erase the effects of years of significant undermanning? Units with disparate backgrounds of doctrinal experience should not be expected to be responsive to each other. This problem is more critical under the global forward-defense strategy because there are within its context worldwide demands for limited resources. These resources are stretched and pulled by the combined drivers of the number of geographical areas and our variety of political, economic, and social national interests. The tension on the responsiveness link is dramatically increased. The link cannot be broken, but as it is stretched, it becomes increasingly inelastic and effectively unresponsive.¹⁷

Following the direction of strategics, we come to the simple conclusion that equal ratios of comparable manning and balanced deployment are essential. The need to make changes in component and mission area authorizations, or at least in manning levels within them, must be examined.

Individual Involvement Emphasis

The preceding two recommendations apply to large entities—operational planning for large units and balancing overall Army force structure. The next discussion focuses on the opposite end of the spectrum: individuals. Policy decisions and other large-scale actions necessarily must precede any broad implementation. What is proposed, however,

demonstrates how responsiveness motivates thinking and allows substantial and pervasive improvements, based on individual contributions, to an objective.

While military forces normally would be expected to have self-sufficiency as a goal, I think that the tendency to divide labor and rely on echelons of backup support exists and counters this goal. Currently, training concentrates on specific and limited sets of skills.¹⁸ Technology and procedural complexity drive us to such a state, but we may have allowed these drivers to have excessive influence. We have used specialization to justify the continued increase in dependence on other specialists for support and to rely too much on other advice, direction, and assistance.

The mushrooming use of the small computer is an obvious example. By developing its use in supply, inventory, and distribution, we have gained a great deal. In the business world and in the military, this technology has led to efficient, centralized supply systems. With improvements, however, has come the utter dependence on the computer operator and, in turn, on the computer repairman. Unnoticed but real is also a dependence on designers of the programs that the computer uses. Whatever the value of the improvements, we have lost some form of ability to control the situation. With that loss comes, too, some loss of responsibility for our own welfare. When the "computer system" goes down, responsibility shifts from user to repairman, who must work his "magic" to resurrect the machine. Similarly, with computer software, programmers must effect changes, because they are the specialists. As we abrogate our responsibility, we justify dependence on the programmer without even a hint of despair.

The danger in overreliance on others is particularly acute for light forces, which operate in the maneuver style, are widely dispersed, and are geared to independent operations.

As a result, logistics must not be as dependent on external support as is logistics for larger, heavier, static forces. Does this mean self-support dictates carrying more or staying closer to a base?

These choices promote neither lightness nor mobility. Yet, moving about more frequently, responding to changes in the situation, being further removed from a base, and carrying lighter loads definitely are part of the principle of lightness. Responsiveness is the link between the strategy-generated need for lightness and the lightness-generated need for independence from external support.

This view may be the best example of the link between logistics and strategy, as well as the most critical application of the concept of oneness for them. We need some way to start the process of building self-reliance.

Recommendation: Training must give new emphasis to knowing everything about materiel and procedures with which duties are performed. Rather than foster specialization, training must develop thorough and comprehensive knowledge and, just as important, foster the desire to gain that knowledge. Such a training philosophy belongs in schools initially, but it also must be continued in the day-to-day performance of duties. Satisfaction with knowing only some part of the story, no matter how well, must go.

Knowledge-in-depth training begins at unit level. Gunners must know how to repair their artillery pieces. Drivers must become mechanics. Radio operators must know how to make one good transmitter from two bad ones. Riflemen must know more than first aid. Everyone ought to be able to cook and drive.

The need for light forces to be independent gives us a glimpse of the link between strategy and logistics. The impact of responsiveness is that independence begets the

potential for lightness in the force. A force confident that it can take care of itself will be less likely to attach itself to a base. A force that understands the value of self-reliance will be better at stewardship, more frugal in its use of resources. The need to make "every shot count" can be a tremendous builder of confidence in unit and individual abilities to accomplish maximum results with limited resources. Such a philosophy also breeds the distilling of missions and objectives. Success comes best and quickest to those who know very, very well what needs to be done. Associated with that knowledge is the confident judgment about what need *not* be done.

Mission awareness suggested here is much more than simply knowing the tasks to be done and the role they play in the greater task. Awareness also means understanding the purpose of the tasks. Sharing the perceptions of this purpose develops a group dynamic and self-assured energy. These factors reinforce the willingness to set about doing the very thing that the group knows it ought to be doing.¹⁹

We have come full circle by arguing that the need for independence generates the need for fuller knowledge of all that a soldier's duties require. Training in this knowledge generates confidence and a sense of the real mission. This confidence and sense of purpose creates the dynamic energy—the cohesion—that allows for a full sense of independence. The knowledge of how to provide self-support—which I recommend we begin to teach vigorously—and the principle of stewardship are both logistics concepts. Yet, logistics based on a responsiveness link creates a type of energy that is not itself logistics. This energy of mission confidence and independence of action is strategic. Clearly here logistics and strategy intermix in this process which I call strategics—a synergistic process whose energy exceeds the sum of its components: strategy and logistics. In oneness is a greater strength.

We should train our soldiers to be more and more self-reliant. If we train a driver to repair his truck by expedient means, we reinforce his need and the capability to take care of himself. Instead of looking for someone else for help, a driver with such training will try to handle his problem by himself. Am I advocating "chewing-gum-and-paper-clip" expedient repairs? Most certainly, and most vigorously! Expedient repairs do not have to be shoddy. And I do not mean to confine the argument to repairing a truck. Equipment *and* procedures can be kept operating in any number of ways if operators know the details of how and why.

I have personal experience with an engine that uses an electric valve to help starting during cold weather. Sometimes this valve causes the engine to flood. I know where the valve is and how to disconnect it; I also know that disconnecting it does no harm and has no other effect on the engine. Neither an automotive engineer nor a mechanic, all I need is the desire to read about the engine to know more about how it works. Of course, I also need success in starting the engine on a cold day in order to reinforce my own self-confidence.

Can we develop super operator-mechanics who are totally self-supporting? Perhaps. What is more practical is to move away from concentrated specialization and the expectation it creates of total support from elsewhere. Such specialization has led away from self-reliance. Training to find it again should not in itself be extensive or expensive, but we do need to tolerate experimentation and its attendant mistakes and damages. I seek the development of a new attitude over the near term. In the longer term, we need to design for self-reliance and self-sufficiency. Design for self-reliance carries with it high costs and extensive changes in doctrine, but it should be the centerpiece of responsiveness in the future.

I have offered three comprehensive recommendations as feasible for immediate utility. In all cases the application in

the near term is much more broad than deep. Development of logistics campaign plans should proceed along with campaign operations plans. Logistics annex work already is underway for theater operations plans, so focusing on campaign details should be fairly easy. Adjustment of component or mission area ratios, if carried out rigorously, will require conversion of units in all components. Total equipment, skill, and facility needs should not be affected greatly, but intensive exchange in all these areas is a likely need. Analysis and planning in preparation for such shifts have a small price tag. Although a make-do attitude can meet many facility requirements, a positive attitude cannot substitute for skills. Training costs for any extensive conversions will be high. The key point may be to determine the need for conversions of units. Actual needs, affected by political, morale, and recruiting considerations, are the basis for longer-term action.

Orienting current training to develop self-reliance will pose almost no problems. Soldiers quickly will grasp the idea that they can become modern-day independent knights of the battlefield. They will build on the concept of cohesiveness, because as self-reliant individuals they will see the potential for contributing even more to the self-sufficiency of the unit.

These ideas suggest again the oneness of strategy and logistics, and they can influence strategic and logistic thinking. The evidence is here that responsiveness illuminates their relativity and the way in which they reinforce each other. Convertibility affords increased energy to both the concepts and the thought processes.

Far Future Goals

New Methods of Linking Logistics and Strategy

Remembering that the near future and immediate utility occur in the next seven or so years—that time over which money resources are more or less firmly committed—any proposal not previously included in the programs and budgets of these seven years must be of doubtful feasibility. The far future then may be defined in terms of the long-range trade-off between time and money. Efforts requiring substantial resources, especially of money, must work their way into plans over a long time. Planners must see a connection between the amount of resources considered “substantial” and the acceptability of any given program or purchase. Smaller efforts demanding only a few million dollars, for instance, require only a small constituency and sponsorship at a level well below that of the corporate board of directors.

In the Armed Forces, approval for this level of support would rest at the two-star level or below. Beyond the seventh year, efforts that require a broad consensus (because they tax resources heavily) will begin to be included in programs if they are overwhelmingly recognized as exceptionally good ideas or imperative requirements.

In the far future, no constraint on resources applies. Furthermore, the current acceptability of a proposal can be irrelevant, although the more an idea flies in the face of conventional wisdom and the greater the costs, the more time

required for consensus. As we think about what should be done from the strategics point of view, I suggest we accept the idea that long-range proposals will require a significant commitment of funds and rise in the level of comprehension of the audience for which the proposals are intended. Only time allows for the simultaneous maturing of both the idea and its audience. Time, not money, then, is the standard against which we might calibrate our measurement of the far future.

The strategic trends embodied in a global forward-defense strategy—and in the growing preference for the maneuver style of ground combat—have led to the need for lighter forces. Synergistically, the three related principles of global strategy, maneuver, and light forces imply a dramatic turn toward a philosophy of independence. Simultaneous conduct of several campaigns in several theaters of operation (global strategy) counters, by means of an ambiguous threat, any advantage the Soviet internal lines of communication present. Such a strategy demands that theater commanders proceed independently; they must conduct campaigns with resources they have on hand. The maneuver style of war similarly requires greater independence of action, innovation, and exploitation: a confident style of war using individual and organizational courage and resourcefulness. The light force imperative itself derives from the need for strategic mobility, necessitated by multiple, simultaneous campaigns, and from the need for tactical mobility, associated with the maneuver style. Independence and mobility with strategics as a midwife begot the logistics child that I have described as self-reliance.

If we pursue the immediate utility goal of a self-reliant attitude, then we must examine how to fulfill the promised benefit of the new attitude with hardware and procedure. That fulfillment comes through a new philosophy of equipment and organizational engineering and development which I will call Design for Self-Reliance (DSR).

Design for Self-Reliance

Design for self-reliance can be applied to equipment, organizations, or procedures. For equipment, the goal is to develop materiel that not only lasts longer than present materiel without external support, but that also can be restored to an acceptable level of operation by the using unit either through resupply or repair. At present, design for maintainability is embedded in the development of military equipment and has seen emphasis for many years. Now most military equipment is extensively evaluated to determine how well it meets the allocation of time needed to repair it, based on its expected daily use.

This design for maintainability is only part of the DSR concept. The DSR concept carries with it the internalization of the basic maintenance requirement, and it inquires into such issues as how to avoid a failure, to circumvent the failure, or to bypass it. Furthermore, the capacity to accomplish this restoration without support must be a system-, program-, or procedural-design criterion.

DSR Configuration Analysis

My first specific proposal based on the DSR principle is an engineering effort that should apply to all existing equipment, items now under development, and future materiel research and acquisition programs. Engineers should analyze equipment to determine where its design can use what logisticians call "redundancy" and can otherwise provide for controlled "graceful degradation"—that is, the knowledgeable use of equipment that has partially failed.

This configuration analysis particularly applies to current inventories. Complex systems likely will have greater potential for hidden work-arounds because components often are created by specialists whose limited scope makes it

difficult for them to perceive the problems their designs might create in the ordinary workaday world.

Consider a voltage regulation component that has a band pass of 100 volts, plus or minus 10 volts. Such a device may power another component that can operate from 80 to 150 volts. An over-rated regulator may have been used for several good reasons—because it was reliable, cheap, or available off-the-shelf—but the supplied component is monitored by a gauge meter that shows a failure below 90 volts and above 110 volts. Configuration analysis will expose the opportunity to open up the metered redlines to below 80 volts and above 150 volts. System tolerances could be realigned properly, and neither the regulator nor the powered component would fail. Though this example is simple, it is realistic.

Configuration analysis also can locate inherent but accidental redundancy. Digital electronics, for example, are most susceptible to unintentional redundancy. The nature of digital processing (fundamentally based on an on-or-off electronic principle) means that many circuits operate the same way, making rerouting of signals almost always possible, sometimes by the simple setting of a switch and addition of one connecting cable. Such alternatives may technically degrade one set of performance parameters for the sake of another—not a bad situation if these alternatives mean that the overall system can still operate. The new state of operability is not as good as the original design state, but it is most certainly better than no operation at all.

Accidental redundancy and alternative use of components are the bases for graceful degradation, especially in present-day equipment. How can we make equipment continue to work with a failed component so that it gives some reduced capability until it is repaired? Configuration analysis must address this question because design engineers often are perfectionists. A good engineer has a natural instinct to design for the best level of performance and to ignore or avoid

the potential for substandard output when some failure occurs. This approach results in the criterion that says that the system is "on" only when it can meet the design performance level. All other situations are theoretical failures in which the system is "off."

We ought to develop reference manuals for users to explain how to coax the last bit of performance out of their equipment. The manual should outline the impact of substandard performance on the mission as well as predict typical follow-on failures likely with degraded operation, enabling users to control the degradation and prolong the utility as long as possible. Thus, configuration analysis of current systems can generate a potential for self-assessment of equipment capability going well beyond the simple "on" or "off" status.

For materiel still being designed, configuration analysis has implications that challenge present-day thinking about redundancy and graceful degradation as design factors. Planners ignore these two factors as design objectives because they normally are expensive and subject to elimination when system costs begin to exceed goals. What seems to be needed is recognition that all equipment must have some degree of operational insurance. We must begin to buy more redundancy and better operation continuance under failure conditions. Including DSR as a system performance element should produce better identification of costs and benefits of such measures.

The key now will be the recognition that this type of designed-in performance is necessary and will be the basis for tolerating and accounting for the added cost. Benefits of added independence for the using unit should prove worth the cost, if we consider responsiveness equal to or more important than efficiency.

Configuration analysis, to improve a system's capacity to compensate for failure, should not cause any subordination

of basic maintenance engineering. The effects of failure still determine whatever steps need to counter them. Symptoms often are ambiguous to the diagnostician, especially when dealing with deterioration of performance, rather than outright failure. However, configuration analysis based on graceful degradation allows us to develop better insights into diagnostics. Diagnostic sensors provide information on general system status, as well as alert us to failure. "Fault-tolerant" computers do this all the time. Thus, adding built-in test features contributes to the overall mission rather than only to the maintenance portion of that mission. Spending money on improving mission performance, rather than on simply making maintenance easier, is more acceptable to planners.

We have touched lightly on the need for knowing what the equipment is likely to do in the future—knowledge which logisticians call "prognostics" or "predictive diagnosis." Rather than searching for the cause of present failure, predictive diagnosis seeks to predict the next series of possible failures, particularly useful in dealing with slowly developing, wear-and-tear failures, though predictive diagnostics are somewhat of a luxury when extensive backup maintenance and supply bases are readily available. The idea is simply to run a piece of equipment "into the ground," because it will be replaced from "supply" or repaired by "maintenance."

Neither of these external sources of support has any need to predict failure, since they know what their jobs are with regard to the item that comes to them "run into the ground." We give little or no attention to predictive sensors except in aviation, where knowing how much life is left in an engine, rotor hub, or hydraulic seal is essential. Survival is the motivator in these cases, because no recourse is available to supply or maintenance at an altitude of several thousand feet.

In the same general sense, independent light forces have less recourse to supply or maintenance. Therefore, increasing

the use of predictive diagnosis in equipment intended for use in the maneuver style of warfare seems prudent. Here again logistics, tactics, and strategy must be considered as one in the planning.

Designed-in predictive diagnostics and configuration analysis are hard to figure in after substantial engineering decisions are over. Predictive diagnostics and configuration analysis are very much hardware-dependent and best applied in basic equipment designs. As with any contribution to design, these logistics elements should be figured in as early as possible along with procedural and doctrinal concepts that support hardware design guidelines. Simply put, we must consider what we expect our soldiers to know and what we will require them to do. These procedural changes are as essential as hardware design features, since they go together to create independence.²⁰

Soldiers today must learn to accept less specialization and greater independence. In the near future, soldiers must know more about the equipment they use so that they can do more with it and do more to it. In the far future, development of skills and training deliberately must incorporate essential diagnostic and repair skills. More than instilling an attitude of self-reliance, this effort would decrease the division of labor; each person would have to do more tasks; a duplication of knowledge would be encouraged. Each crew member ought to understand several ways to cure various problems in both primary mission and logistics support. A synergistic knowledge makes each crew member, and hence the entire crew, stronger, more flexible, more reliable. Although the cost of such training would be high and would seem to be redundant, such training would not be wasteful. Such training would support crew, unit, and organizational cohesion, which in turn supports independent action, willingness, and capability. Design for self-reliance in the *service* of equipment implies exactly the type of hardware design and skill packaging I

have suggested. Similar considerations can be applied to other functions of logistics.

DSR Stewardship

Design for self-reliance is not limited to equipment planning, operation, and maintenance. Beyond maintenance, logistics for fielded forces includes administration, supply, transportation, and personnel support (such as medicine, food, shelter, and laundry). The word that best describes the art of making optimum use of that which has been provided is *stewardship*. We discussed maintenance from the involvement viewpoint in the previous section. Now, I would like to discuss maintenance and supply under the concept of stewardship.

One of the greatest problems that light forces may face is the difficulty of getting repair parts. A possible solution is the increased use of cannibalization. Often called controlled substitution, cannibalization is the use of parts from one disabled item to repair and restore another. Discouraged when a normal resupply support system is readily available, the practice creates hulks that are uneconomical to repair and obscures demand information if use of cannibalized parts is not reported into the supply data base. When units are in the field and are either moving too quickly or are too widely dispersed, their access to parts supply from doctrinal sources will be unpredictable.

One method of providing parts would be to carry more spares at the unit level. But this approach increases the "weight" of a unit, which ideally should be as light as possible. Cannibalizing, therefore, has appeal for supporting light, maneuver-oriented combat units.

The concept of stewardship leads us to seek ways to employ more cannibalization. Materiel-people-organization

systems should be studied to develop procedures under which equipment is cannibalized. Soldiers must be trained to do more than take the part they need and leave the rest. Criteria for the decision to cannibalize must be based on engineering. The extent of parts removal would have to be made dependent on time constraints as well as on a prediction of whether the materiel cannibalized can be reused. When heavy battle damage has identified a vehicle for cannibalization, using units obviously will want to take all useful parts, ignoring restoration if damage is so extensive that restoration by any level of support is impractical. Part of the assessment will be the verdict on restoration. If it is possible, then enough of the cannibalized equipment must be left intact to allow for recovery. Enough axles and wheels, for example, should remain on a combat vehicle or truck to allow it to be towed or moved.

Recovery at some future time raises two other ideas. The first is that we must gain full utility from all our materiel resources. Stewardship means that we cannot waste anything that has use, even though we ourselves cannot use it. A system of reporting hulks and disabled equipment to higher headquarters must become part of the using unit's intelligence effort. Backup support then can include the cannibalized item in a battlefield recovery plan.

The other idea is to design equipment for self-recovery or mutual recovery and to train operating crews to carry out recovery procedures when time and situation permit. By and large, recovery is a problem that only involves vehicles. Smaller items—such as weapons and radios—are recovered by not being thrown away. To a great extent, vehicle recovery means towing, so no great technical problem exists. Design for recovery means including tow and jack points in the vehicle design and providing basic tow bars, jacks, supports, and braces to carry out recovery. Necessarily, this requirement carries the need to train crews and operators in the basic

skills necessary to accomplish quick, safe, and effective recovery. Examples of such skills are where to put the jacks for the best mechanical advantage and how to use a combination of tow bars and chains to ensure safe control of a towed load.

As I see it, user involvement is the most important aspect of stewardship. Resourcefulness has more and more value in the global-maneuver-lightness scenario. In almost all the stories about war that I have read or seen, some character is truly resourceful. Unfortunately, this character almost always is unscrupulous, avaricious, self-serving, comical, or criminal, like *Catch-22*'s Milo Minderbinder. He is, of course, the official or unofficial supply agent who can get anything—from fine wine to an unauthorized tank. He almost always is likable because he will redeem all his bad traits by providing the item critical to the mission, no matter how seemingly impossible it is to get. He is the scrounger!

We must adopt something from this scrounger mentality because resources often are critical. Global forward defense means simultaneous commitment of forces, with no piecemeal prioritization. Maneuver and lightness cannot ignore the need to "make do." Looking back to the support tail will cause the sure loss of opportunities so essential to the successful application of both the concepts of maneuver and lightness. Will we dare suggest that the scrounger should become much more than a lovable anti-hero? Can we forsake our love for standing procedures and neat demand data, with their concomitant and unforgiving dependence on the backup support system?

Because light-maneuver warfare, like any large enterprise, needs discipline, control concepts may be helpful. At the outset, we need to agree that such an inventive supply system is needed. Such recognition should create an environment in which doctrine for the art *and* science of scrounging is defined. The extent to which this structure might erode the

nature of artfulness is an important question. Until we define "expedient supply" or "scrounging," we cannot begin to know whether it can be reinforced by structure and science. As another control, each soldier must become familiar with expedient supply. Expedient supply could become a system of finding what is needed on a fluid battlefield and reporting and sharing information. As we seek ways to support light forces, we must expect those forces to be resourceful. If light forces take the field armed with techniques and with the self-confidence that ways to "make do" are available, then they can preserve their lightness and still be successful in their independence.

A greater burden must be placed on the individual and the unit in contact with the enemy. Dispersion and independence of action dictate this burden. The relative advantage of such involvement is responsiveness to combat, logistics, and strategic needs. Responsiveness breeds self-sufficiency, which yields confidence, which supports the premises of light, maneuver-oriented forces. The synergistic reinforcement generated is further proof of the relativistic relationship between logistics and strategy and of the thinking process inherent in the strategics discipline.

Operational Support Management

Having proposed several ideas that shift the logistics responsibility to the tactician and the strategist, I am open to the charge of forgetting the role of support. But forces in combat must become more self-reliant—such is the nature of logistics in the maneuver style of warfare. Such also is the condition for the simultaneous forward-defense strategy. What self-reliance means to the forward unit also applies to progressively higher levels of command and organization. Operational-level campaigns and theater-level strategy must be planned and executed with greater independence than the more limited one-and-a-half-war concept.

Under the heading of Operational Support Management (OSM), I will address the directions that can be taken to create responsiveness in higher-level logistics support forces. Leaders at these levels must deal with complex technical procedural systems and doctrinal and force structure imperatives as well as a more comprehensive time-and-distance environment. Their problems are to command their forces, to lead their people, and to manage their systems of resources. The integration of goals and resources and the control and feedback nature of their activities are especially well identified with the concept of strategies on which this essay is based.

For this reason, I feel that we must address the collection of proposals that follow as a comprehensive management approach.

OSM Functional Cohesiveness

Functional specialization seems pathologically endemic to logistics. Witness the history of the development of technical services in the US Army. Some recent evidence hints at slight remission in the disease of specialization: the 1984 Officer Personnel Management System Study does propose to reduce the number of technical specialty codes under which Army logistics officers are assigned. This small step will produce logistics officers with more comprehensive knowledge. Excessive specialization is a dangerous symptom of the fragmentation forced on us by the advancement of technology. Apprenticing in some modern complex enterprise—warfare, for example—means “starting somewhere” by *specializing*. Over-specializing, however, seems to lead us away from responsible action. The logistics system, for example, should ensure the maximum readiness of the Army's truck fleet. When the fleet isn't near maximum, the maintainer blames the supplier for the lack of parts, and they both blame the transporter for poor deliveries. Of course, the tendency to look outside of one's realm to fix responsibility for

failure is part of human nature. This instance, though, suggests that specialization creates an environment that opposes cohesion and the singleness of purpose on which complex enterprises depend for success.²¹

Certainly, every specialist is not trying to escape responsibility; nevertheless, specialization in logistics tends to multiply perceptions of what the greater enterprise is about.

I have avoided discussing the *functions* of logistics because logistics is the everything-else art and science; logistics includes hundreds of possible functions since everything needed to support warfare could be included in the list. One function in particular—*distribution*—seems to have the best promise for demonstrating the concept of increased cohesion. Recall that an operational level is the point at which the national level of support is integrated with the tactical level, the level at which use of resources takes place. I suggest that one logistics function have as its objective the conversion of the large-scale, wholesale, resource inventory into retail or useful amounts of people and things. These people and things have *general* utility at the operational level, which must become *stratified* utility at the tactical level. This function is distribution.

To the military, distribution has several official meanings, most of which are specific and only coincidentally related to logistics.²² One definition states that distribution is "that functional phase of military logistics that embraces the art of dispensing materiel, facilities, and services." This definition leaves out people and information, both, I argue, a part of the distribution function. If for my purposes I want to view distribution as a combination of supply, transportation, information, and control, then functional cohesiveness dictates that we bring all or part of each of these functions under the umbrella of distribution. Providing ammunition, for example, requires information about what is needed and where

it should be delivered as well as other information about where stocks of ammunition are located. The supply science function then performs technical analysis of types and calibers. Actual movement, of course, belongs to the transportation function.

Within this overall effort, inventory control is part supply service and part management control. To a great extent, the operational-level (corps) staffs already deal with this combined function. The question I raise is whether we should reorient organizational and doctrinal concepts within a master function called distribution, the rationale being the need to provide a mechanism for improved, operational-level management of resources, whether fuel, food, ammunition, equipment, people, or information. Additionally, a distribution function could better exploit some physical equipment opportunities.

One piece of equipment used widely in commercial business, the palletized load-and-delivery system, fits the umbrella function of distribution. The most commonly seen application involves very large trash collection containers. These containers hold waste later hauled to a dump site by a special truck designed to load the entire container, transport it, and empty it. Only time and distance determine the number of trucks needed to support a rather large number of containers. Because one truck serves many different customers and locations, requiring only individually dedicated containers, owners save considerably through smaller truck fleets.

Military loads certainly can be palletized in a variety of ways. Pallets of ammunition could be built from cases stacked on flat pallets. Fuel containers could form their own type of pallet. General supplies could be loaded in containers compatible with aircraft and ships. Hospital shelters also could fit on pallets, as could headquarters with their communications. Services can be packaged onto laundry, bath, and kitchen pallets.

These prearranged units of support can then go where needed. Their distribution is a functional combination of transportation, inventory, requirement control, and time-and-distance management. The concept of functional cohesiveness will allow both flexibility and tight control of support assets. The new focus should be on distributing backup support in the best battlefield position to respond to shifting needs of the maneuver-oriented combat force.

Support forces also must face the danger of concentrating assets for efficiency. The enemy will target the massive logistics support. One way to protect stock is to move the support frequently and keep the assets in smaller packages. But if we move away from the goal of efficiency and toward responsiveness, we can better serve the objective of supporting the maneuver force because logistics becomes a part of that maneuver scheme. Such concepts as palletized loads using a time-shared transportation network can reduce the amount of equipment dedicated to overall support and the number of people in the proverbial logistics "tail," also reducing the support force.

The concept of distribution generates better cohesion in the support force through a common view of the objective. Distribution emphasizes the need for a control mechanism for operational-level logistics. Before we discuss this mechanism, which I will call "technical control," I want to discuss another new battlefield function that operational-level commands must take on—organizational restoration.

OSM Organizational Restoration

Even without nuclear weapons, the modern battlefield will be a place of devastation. We already have argued for the practice of cannibalizing equipment, and we also have implied that units deliberately will abandon equipment and yet continue to operate for long periods of time. We have

spoken of controlled graceful degradation with the clear implication that units would "work themselves down to the nub." Either because they have been hit by a devastating attack or because they simply have exhausted all means of internal support, major units of battalion to brigade size will probably require extensive refit and reconstitution as they operate in the maneuver scheme of battle.

Assets to manage and accomplish restoration of an organization of a thousand or so people will exist at the operational or corps level. A number of predictable uncertainties will make the need for responsiveness ever more important, as corps logisticians execute the function of organizational restoration.

Each unit in need of restoration will have a unique set of requirements. Varying requirements make up one of a set of uncertainties. Additional uncertainty is created by the time-and-space dimension of the battle area. Restoration may very well best be accomplished right where the unit is. In that case, the extension of support forward gains an unprecedented level of importance. So we have both location and hostile conditions as uncertainties.

Another uncertainty is resource status, not only because we don't know where resources will be but also because we can expect some resources to come from other devastated units, from wholesale sources, and from distributed corps assets. Determination of answers to these uncertainties creates a new form of battlefield intelligence.

Development of comprehensive, friendly, logistics potential will support an organizational restoration of any of a variety of corps units. No doctrine has been established yet for this sort of massive personnel and materiel assessment; no organization can carry out the actions associated with both people and equipment. A new type of team is needed to assess a unit's requirements and manage the input and application of resources that can be applied to the restoration.

This assessment function—which has a clear combat orientation—belongs to the resource provider, the logistician. There is a clear requirement to develop the doctrine and organizational design that can accomplish this new restoration function. Although assessment and management will occur at the site of the restoration, and, therefore, come under the reconstitution team's responsibility, the questions remain: where will resources be found, and how are they to be brought to the restoration site? These questions must be answered by the operational-level support headquarters. The processes to gain the answer are the same overall processes needed to provide responsive support to a much more dynamic battlefield. Such a set of processes can be gathered together in a technical control function at the operational level.

OSM Technical Control

The fundamental question about functional requirements has been answered in terms of a general need for better cohesiveness. Cohesiveness can be gained from a reorientation of the more classic functions into combinations keyed to the new supported force—by, for example, combining supply and transportation into distribution. Functional cohesion specifically causes functions to come together.

From another viewpoint, we established the need for a new logistics function called organizational restoration, and we sought the creation of teams and procedures to accomplish this function. These teams need support in finding resources to fulfill the requirements they develop. So both functional cohesiveness and organizational restoration point to the need for new concepts of command and control at the operational level.

Corps logistics organizations already exist. These units form an appropriate nucleus for the responsiveness-oriented support required in the maneuver environment. Army combat

developers can undertake the needed analysis of these unit missions and resources, based on the following:

- *Criteria*, such as passback workloads from light divisions.
- *Functional innovations*, such as distribution implications of palletized loading.
- *New missions*, such as reconstitution or organizational restoration.

But these functions themselves call for another new function: the management of operational-level resources over the entire battlefield. A new mechanism to integrate technical support missions and capabilities at corps and division level seeks sponsors for its creation. Whether division-support commands remain viable in maneuver-style warfare seems a valid question. In any case, the interface that occurs between the wholesale support system and the tactical user continues to occur at the operational or corps level.

More than anything else, the corps logistics command needs to enlarge its ability to gather, analyze, and synthesize information about the entire corps battlefield. Support down to brigade level may have to be directed from a corps-level unit, yet no present day command or information link exists between these elements. Moreover, corps logisticians orient their staffs on functional areas, and personnel, medical, and administrative functions are centralized outside the corps.

How can the mission of unit restoration be managed when operational-level assets are fragmented, with people coming from one level and materiel from another? Efficiency wrongly reigns supreme today, so responsiveness and cohesiveness as objectives remain secondary.

Responsiveness and cohesion belong at the top of the logistics priority list. We need a hard look at corps-level

technical control missions and assets; doctrine should be changed when complete support resources are not under the technical control of the corps. The force development process should create the information management cell that should be added to either the corps headquarters or the corps logistics command. This cell of equipment, skills, and procedures will form the basis for the technical control function, which must be accomplished at the corps level. Such a logistics function is associated with the responsive management of resources allocated or created by the corps.

In addition, the corps headquarters or the corps logistics command needs a logistics operations center. This element should be manned by people with an orientation other than functional efficiency. The center would develop the friendly situation in real time and capitalize on opportunities created to accomplish support missions. Rather than scheduling support and refit for units of any size, the support center would send support to the units at opportune lulls in combat contact. Similarly, the corps will become aware of emergency needs for such commodities as ammunition or fuel as they occur. We can safely predict that these needs would be much less predictable in the maneuver-style than in the firepower-dominant mode of warfare.

The key factor is responsiveness to the real need, not to the cry for help. If corps logisticians hear the cry for help, they have failed to keep up with the need. They have not been responsive—they have waited too long, and they now are merely reacting.

Simultaneous military campaigns could be easily imagined in Europe, Korea, Southwest Asia, and Central America. The major element of command of ground forces in all these areas (except Europe) probably will be a corps. We need sufficiently developed and supported doctrine to allow these campaigns to manage their own support. The link between logistics and strategy causes this need to exist.

And operational independence, if we ever achieve it, would prove that logistics and strategy are simply colors in the same spectrum, with strategics and responsiveness providing the knowledge and methods to blend the colors to best mutual advantage.

Epilogue

Questions, Choices, and Imperatives

“If not us, who? If not now, when?” President Ronald Reagan raised these questions in his Inaugural Address on January 21, 1985. He was speaking about balancing the Federal Budget, but the questions inspire two general thoughts.

The first thought, which seems to be in full agreement with the President’s intent, is that the best way to prevail over great challenges is simply to begin. Avoiding a problem only ensures that it will continue to be a problem. One vital challenge is to change the way we approach logistics and strategy. To denigrate logistics as “merely” supply and transport is wrong. We must begin thinking about logistics in the same way we think about strategy.

Logistics is so much more than the realm of clerks and calculations, paperwork and procedures, limiting factors and liabilities. When we begin to recognize that logistics is an art and that talent for it can be developed, we will begin to create the potential for worthwhile schemes that *will* affect the future of warfare. If, as I have said, logistics is the *physical* manifestation of warfare, then the more it becomes important and real, the more that support and stewardship of preparedness will contribute to peace through deterrence. We must begin and we ought to do it now. “If not now, when?”

This second point raised in President Reagan’s speech is, at once, more practical and gloomier because the question

of *when* springs from the threat of limited resources. The President was saying that we must begin to deal with the Federal deficit here and now, because if we don't we will never find the will to pay for the programs as they are executed. For too long we have desired, across government, more than we are actually *willing* to afford. Affordability is, after all, a measure of the collective will to commit resources. But, as we approach realistic limits, resistance and friction prevent us from ever testing absolute limits.

In particular, the American military professional must come to grips with the reality of limits. In World War II we may have seen from our citizens the last clear and pervasive commitment to all-out war. All the recent signs suggest that we must recognize the limitation of resources that will prevail in future wars. We cannot continue to expect that we can do anything that we feel is needed, because the resources of the United States are not unlimited. We also must recognize that special-interest groups, preoccupation with the rights of minority opinions, worship of consensus, and failure in the 12-year war in Southeast Asia, have all affected national will. Even if the United States still possesses the greatest natural wealth among nations, perhaps it is also true we have reached the point of full exploitation of that wealth.

Two imperatives remain:

- We must recognize that the venerable military spirit of "can do" has to be set aside for more pragmatic alternatives. We "cannot do" all things. The promise of omnipotence symbolized by "can do" has become dangerous. We must make choices from now on, like the British defense professionals have had to make for many years.

- We must agree that logistics is the branch of military art and science that underpins the fighting capability. Further nonsense dividing logistics from strategy and honoring "strategic thinkers" while denigrating the logistics "bean counters" will cost the nation dearly.

Can't we raise logistics to a new place of worthiness equal to that of strategy? Can't we imagine that doing so will foster a synergism that will enhance both strategy and logistics?

Responsiveness to the needs of the "other half"—whether that half is strategy or logistics—is the new order. Questions about tooth or tail, readiness or sustainment, maintenance or training, investment or operations, equipment or manpower, and so on can be approached from the more inclusive viewpoint of strategics. Responsiveness carries reaction beyond reflex counteraction; it connotes measured, positive activity, reflective of needs and stimuli. Logistics and strategy have unique harmonic qualities, because one is analogous to the physical, and the other to the spirit. Unanimity of purpose—and especially the singleness of perception of purpose—is a mark of excellence. We no longer can allow fragmentation of logistics resources or lack of control over them. Global strategy requires that every campaign be supportable with greater independence, and that the campaigns be executed with practical stewardship. Only a "strategics" approach makes that goal possible.

I have emphasized in this essay the themes of independence, resourcefulness, involvement, self-reliance, stewardship, oneness, all resting on the essential measure of merit I have called *responsiveness*. I recognize the danger in any analysis that concentrates on a single criterion; nevertheless, I feel that responsiveness is effective as a measure because it cannot be internalized. Inherently, it is an external measure of merit; it drives logisticians to understand their customers. The only danger that I still recognize is my irreverent dismissal of *efficiency*. What place this measure has is not for me to determine here, other than to say that it cannot have first priority when security of the nation is at stake.

This essay introduces *strategics* as a word to identify the concept of oneness for strategy and logistics. This is *not*

unnecessary tampering with the natural order of things. I see a need to clarify and develop this new field of study. For the purpose at hand, I have no doubt about the theoretical oneness of strategy and logistics, and the value of responsiveness as the linking factor between the two seems to me to be beyond challenge.

Although the examples contained in this essay are drawn directly from land forces, in particular from those of the US Army, much of the thought and all of the processes are fully applicable to other Services, requiring only imagination and selectivity to find where best to use the concepts that grow out of an appreciation of strategics. Every reason exists to believe that the basic ideas developed here can be related to any enterprise that has a main purpose (policy), a plan (strategy), and an infrastructure of support (logistics). As we plan that enterprise and forge the capability to achieve our goals, we should remember that *strategy* and *logistics* are one, linked by *responsiveness* and comprising a new field we might call *strategics*.

Endnotes

1. Martin van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (Cambridge: Cambridge University Press, 1977), p. 231. The lack of written material on the study of logistics is briefly decried simply as an unfortunate fact of life. By and large, thought on logistics is not recorded.

2. Ibid., p. 237. As the last sentence in this landmark study of modern logistics, Napoleon's dictum that the spirit is still more important than the physical is a fitting reminder.

3. Ibid., pp. 232-5. This short discussion summarizes various ideas on how logistics historical periods can be delineated. I prefer the major division that fixes WWI as a point after which technology essentially became a more dominant factor.

4. Ibid., p. 237. Again I observe that morale must not be degraded in any way.

5. Omar N. Bradley, General of the Army, *A Soldier's Story* (New York: Holt, Rinehart, and Winston, Inc., 1951), p. 50: "... I often explained to my staff that G-2 existed to tell me what should be done on the basis of his information concerning the enemy. G-4 was to tell me what could be done in view of our limitations on supply. Then once I made my decision, G-3 was to do it. Thus, a timid G-4 could directly restrict the scope of his commander's operations. And similarly a resourceful G-4 could expand it. Fortunately, my G-4's were always resourceful." (Note: G-2 is a staff agent who gathers information and intelligence, G-4 deals in support and material logistics, and G-3 plans and oversees the execution of orders.)

6. William S. Lind, "The Case for Maneuver," and Lieutenant Colonel Huba Wass de Czege, "Toward a New American Approach to Warfare," *Papers Presented at Senior Conference XX*

on The "Military Reform" Debate: *Directions for the Defense Establishment for the Remainder of the Century* (West Point, NY: United States Military Academy, 3-5 June 1982), pp. 17-75. These papers provide a good overview of the maneuver versus firepower argument. The point of contention seems to be which style of warfare ought to be preeminent. Firepower advocates favor the use of massive or intense firepower to fix the enemy force and destroy that force by attrition, a technique the United States tried in Vietnam. Maneuver emphasizes the movement and positioning of forces to attack the enemy's ability to employ his forces in formations and according to the plans he intended. It has been suggested that such a style of warfare addresses itself more to the mental than to the physical well-being of the enemy. Necessarily, this style of warfare will depend on an increase in decentralization, in speed, and in resourcefulness. The depth of battle or, more importantly, the depth to which firepower is applied will have to increase dramatically. Exploitation gains new importance.

7. Alfred Thayer Mahan, Admiral, *The Influence of Seapower Upon History 1660-1783* (Boston: Little, Brown, and Co., 1918), pp. 9-10.

8. Thomas J. Peters and Robert H. Waterman, Jr., *In Search of Excellence, Lessons from America's Best-Run Companies* (New York: Harper and Row, 1982), pp. 306-8. A refreshing view of the informal matrix is presented here. The key seems to be recognition that matrix management is with us, no matter how many line and staff charts we draw.

9. Ibid., pp. 63-67, 150-54. These arguments about simplicity are not so new, but their context is. Whatever these authors contributed, the one best thing is the stage from which they have spoken (written); their books should be read, if for no other reason than that.

10. L. D. Holder, "A New Day for Operational Art," *Army*, Vol. 35, No. 3 (March 1985), pp. 22-32. This article, by one of the principal authors of the current US Army Field Manual (FM 100-5), *Operations*, can improve one's perception of the meaning of the operational level of warfare.

11. William R. Williamson, "Campaign Planning," *Parameters: Journal of the US Army War College*, Vol. XIV, No. 4 (Winter 1984), pp. 20-25. A very good introduction to campaign

planning for those not familiar with the concept. The weak mention of logistics on page 24 supports my point about the need for details in the area of logistics.

12. Richard H. Thompson, General, "Reshaping the Logistics Forces," *Army Logistician* Vol. 16, No. 5 (Sept.-Oct. 1984), pp. 2-3. This article summarizes the actual effort undertaken by its author to validate the requirements for logistics support in the US Army.

13. Peters and Waterman, *In Search of Excellence*, pp. 156-7. This reference is one of many in the book that place the customer first and foremost. Good advice to anyone who provides something to others.

14. de Czege, "Toward A New American Approach to Warfare," pp. 70-71. At the end of this paper, the author makes two points: a mix of light and heavy forces is needed, and strategic mobility is still important.

15. Lind, "The Case for Maneuver," p. 20. The author makes the point that the maneuver style of warfare targets the enemy's cohesion (his mind) so that force effectiveness is destroyed through disruption of the enemy's ability to operate within his concepts, plans, and procedures.

16. John A. Wickham, Jr., General, "Today's Army: Landpower in Transition," *Army, 1984-85 Greenbook*, Vol. 34, No. 10 (October 1984), p. 31. The Chief of Staff of the Army discusses a variety of things that are changing the Army. His specific comment on "Infantry Formations" is referenced here, but the entire piece is recommended, since it supports a great deal of what *Strategics* tries to encompass.

17. John Keegan, *The Face of Battle* (New York: Penguin Books, 1978), pp. 298-9. The concept of links which become strained and stiff is discussed here as a constraining connection of combat forces to their bases of support. The usefulness of the linkage metaphor seems, therefore, to be supported. If the linkage tends to be stiffened by stretching, we must find ways to restore flexibility and ensure responsiveness.

18. *Ibid.*, pp. 319 and 325. Keegan writes that because there is a "continuing division of labour within armies," specialists have no

more skill than is needed for their assigned "very simple functions." He relates this to a cultural trend. Builders of armies and modern culture seem to rely upon automatons executing their limited duties with precision and efficiency. The question I raise is whether this is the wise use of the human resource, especially since I do not see people as automatons. I interpret Keegan as supporting this idea of human value.

19. Peters and Waterman, *In Search of Excellence*, pp. 285 and 290-1. The idea that agreement on values and purpose is based on understanding runs throughout the "search." Doubting must be permitted, since it relates to methods, but basic values and goals must be understood and supported if progress is to be made.

20. John N. Tragesser, "MANPRINT—Manpower and Personnel Integration," *Army RD&A*, Vol. 26, No. 1, January-February 1985 (Published by Headquarters, Army Materiel Command, Alexandria, VA 22333). This article describes development of a technique to ensure better understanding of the man-machine relationship.

21. John Naisbitt, *Megatrends* (New York: Warner, 1982), p. 94. Too much cannot be said about the need to share the vision of what an enterprise is about. Here we find a good argument for having common knowledge of the collective purpose, at once both visionary and specific.

22. *Department of Defense Dictionary of Military and Associated Terms*, Joint Chiefs of Staff Publication 1, 1 April 1984, p. 117.

Distribution—(DOD IADB) 1. The arrangement of troops for any purpose, such as a battle, march, or maneuver. 2. A planned pattern of projectiles about a point. 3. A planned spread of fire to cover a desired frontage or depth. 4. An official delivery of anything, such as orders or supplies. 5. That functional phase of military logistics that embraces the act of dispensing materiel, facilities, and services. 6. The process of assigning military personnel to activities, units, or billets.

The Author

Colonel Kenneth N. Brown, United States Army, is an Ordnance Officer affiliated with the 29th Field Artillery Regiment. He earned a Bachelor of Aeronautical Engineering degree from Rensselaer Polytechnic Institute and a Master of Science in Aerospace Engineering from Georgia Tech. He has served in logistics, materiel acquisition, and force development positions in the Army and the Office of the Secretary of Defense, and has commanded logistical units at company and battalion level. Following his tour of duty in the Office of the Deputy Chief of Staff for Operations and Plans, Headquarters, Department of the Army, he was assigned in 1984 as a Senior Fellow at the National Defense University, Washington, DC, during which time he wrote this essay. A graduate of the Army War College and the Industrial College of the Armed Forces, Colonel Brown is now the Army Project Manager for Air Defense Command and Control Systems at Redstone Arsenal, Alabama.

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