INTEGRATING THE U.S. INDUSTRIAL BASE: STRATEGIC NECESSITY FOR AMERICA'S FUTURE

GREGORY D. FOSTER

Tomorrow's Integration Today

America's future strategic vitality and effectiveness almost assuredly will bear a direct relationship to the viability of the country's industrial base. The viability of the industrial base, in turn, will depend not on its preservation of capabilities and methods attuned to a bygone era, but on its relevance and responsiveness to the world of tomorrow. It is essential, therefore, that proposals to change the configuration or performance of America's industrial infrastructure be grounded in the future — both as our strategic posture would have the future be, and as established trends suggest it is likely to be with or without strategic intervention.

Several features of the emerging international environment have potentially significant ramifications for the future structure and functioning of the U.S. industrial base. For one thing, we are witnessing a redistribution and dispersion of global power in which massive military strength and traditional ways of employing it may no longer be necessary or even especially useful. Economic security has assumed clear primacy over military security. That which contributes to the latter without diminishing the former will become increasingly beneficial and essential, while that which produces the latter at the expense of the former will become largely detrimental, and perhaps even debilitating, to our strategic well-being.

A wider range of threats and constraints than we recognized or acknowledged during the Cold War now faces us. Dealing effectively with these manifold challenges will require an order of adaptability, flexibility, and creativity — in the capabilities we field and the methods that produce those capabilities — which far exceeds anything now in place. Expectable and justifiable budgetary limitations will demand greater strategic payoffs for dramatically reduced defense expenditures. Heightened ecological awareness will engender pressures for environmentally sound military effectiveness. Media saturation and sustained advances in telecommunications technologies will provide near-instantaneous global awareness of violence, destruction, and human suf-

Gregory D. Foster is presently the J. Carlton Ward Distinguished Professor at the Industrial College of the Armed Forces, National Defense University, Washington, DC.

fering, while simultaneously magnifying the negative effects of lethal weaponry and lowering the threshold of unacceptable force.

Growing levels of regionalization and globalization by both governmental and industrial enterprises will further blur the bounds of sovereignty, ownership, and accountability, while materially increasing interpenetration and interdependence. There undoubtedly will be continued migration of industrial-age manufacturing capabilities overseas — especially to developing countries bent on modernization, hungry for status, and possessed of abundant, cheap labor. Finally, technological advance, turnover, and diffusion can be expected to accelerate even more dramatically than in the past. The duration of the technology life cycle — from concept origination to product obsolescence — will, accordingly, diminish further, and thereby accentuate the demand for consumer awareness and responsiveness.

These and other future developments will provide one set of critical boundary conditions for the future U.S. industrial base. Even more important in determining what the base should look like and how it should operate will be the country's strategic orientation — the objectives we pursue, the priorities we establish, and the means we employ to attain our ends. For example, if in pursuit of the long-term objective of enduring international peace, we fundamentally reoriented the U.S. military — from traditional warfare to peacekeeping, nation-building, and humanitarian assistance — this would call for forces armed, equipped, organized, and trained completely differently than those we now have. Light, versatile, perhaps even perishable capabilities would take precedence over heavy, durable, sustainable ones. Nonlethal weapons that disable rather than destroy might come to dominate — or even displace — lethal weapons.

Or let us say that we sought to dramatically reduce our dependence on overseas oil. In purely technological terms, this might mean producing vehicles that are highly fuel-efficient or use alternative forms of energy. If we push the limits of what is now only science fiction, such an objective could mean developing human displacement capabilities that make vehicles as we know them altogether obsolete. In operational terms, reducing or eliminating oil dependency might mean eliminating the need to field the heavy military forces and accompanying equipment required to preserve access to oil in such locales as the Persian Gulf.

There are numerous other examples of how our strategic posture might affect the industrial base we need. If, in pursuing global demilitarization, we sought tighter restrictions on conventional arms proliferation abroad — perhaps even to the extent of a United Nations ban on international transfers of lethal weaponry — this could have a significant impact on an industrial base now heavily dependent on overseas arms markets. The unavailability of such markets might even prompt us to reformulate our "requirements." Similarly, we might place sufficient future importance on multilateralism, and on interdependence and interoperability, as mechanisms for enhancing alliance or coalition cohesion, that we would see fit to relinquish the capability to produce a particular weapon or family of weapons to an international partner.

Whether coherent strategic guidance is available to focus and orient the industrial base, the evolving (or enduring) nature of war will have much to say about industry's ability to support military requirements. If the future portends a mere continuation of war in traditional Clausewitzian terms, there is little reason to alter either the configuration of the base or the nature of military requirements. This would leave us still, though, to resolve the question of how to bridge the gap between military and commercial industrial applications.

Alternatively, the proposition of futurists Alvin and Heidi Toffler, that warfare is assuming the same "third-wave" characteristics of the industrial workplace — precision, tailoring, and information- or knowledge-based operations, compounded by spatial expansion and temporal compression — suggests a reasonable probability that there may be a sort of spontaneous convergence underway between military and commercial practices that could consummate itself more fully in the years ahead.[1] By the same token, to accept the notion that third-wave warfare will be the future norm is to acknowledge the potential that exists for major realignments in operational roles, missions, and priorities among the armed services. An example might be greater future emphasis on air- and space-based capabilities for waging war on land and sea.

We might go a step farther even and speculate that we are on the cusp of a grand evolution that has taken us from an extended historical period of *Hot War* — in which the actual use of military force and large-scale collective violence were central features of statecraft — to a compressed period of *Cold War* — involving military posturing and threats for coercive purposes — to the current period of *New War* — in which non-military instruments of power and the recurrent use of the military for non-traditional purposes predominate.[2] If this grand evolutionary hypothesis is correct, it suggests the need for a new-age industrial base with a military component materially different than at present — one that could readily adopt the characteristics of its commercial counterpart with little risk of neglecting increasingly rare militarily-unique requirements.

There are yet other questions concerning our notions of future warfare that have obvious implications for our industrial posture. For example, what do we see as the preferred human role in future combat? Do we want to reduce (or even eliminate) human presence on the battlefield — thus perhaps suggesting the concentrated pursuit of such technologies as autonomous vehicles, robotics, extended-range self-guiding munitions, and the like? Will overwhelming force continue to be a governing principle of conventional combat, or might it be replaced by a new concept of "minimum essential force" that reflects a greater sensitivity to the negative strategic consequences of collateral damage? How relevant will other traditional combat notions continue to be (occupying terrain, for example, as opposed to simply controlling it; destroying, rather than simply neutralizing or immobilizing, one's adversary)?

---

1. See Alvin and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the 21st Century* (Boston: Little, Brown, 1993).
2. The logical end point in this evolutionary progression would be a condition of *No War*, in which absolute nonviolence is the prevailing mode of dispute resolution.

Coming to grips with the preferred and actual future(s) before us will help ensure only that the industrial base is *relevant* to the world of tomorrow. Such relevance is of course essential — a necessary, but insufficient condition for industrial viability and strategic effectiveness. The other measure of viability — responsiveness — will depend primarily on how well integrated the base is. The quality of integration will depend on how sophisticated our understanding of the concept is and how well we are able to translate that conception into reality. As a first order of business, therefore, the future enjoins us to consider anew what integration is all about.

Simply stated, integration represents: those measures designed to enhance or ensure mutual (two-way) *conversion, transfer, substitution,* or *interchange* of resources (human, material, financial, natural, or informational) from one use or purpose to another with as little *retraining, retooling, reconfiguration,* or *relocation* as possible in order to minimize *cost, time delay, disruption and confusion,* and *dislocation* (of the economy and the labor force).

Integration may range from relatively stringent forms of commonality, uniformity, or standardization to more lenient forms of compatibility or interoperability. Integration seeks — and reflects — a measure of sameness, or at least similarity, designed to produce a more-or-less seamless transition between the military and civilian domains of activity and between routine conditions — where demands are ordinary — and emergency conditions — where demands assume extraordinary proportions.

As we progress farther beyond the Cold War and become both more conscious of the inherent complexity of the world around us and less able to justify defense expenditures of the magnitude we are accustomed to, the importance of a fully integrated industrial base will become ever more evident. The recognized advantages of integration will assume added significance: streamlining, and the associated reduction of wasteful duplication; improved efficiency in the allocation and use of resources; simplification; enhanced understanding (by making comprehensible what previously may have been obscure because unique or segregated); and, most notably, affordability.

The ultimate payoff, though, will continue to be strategic. Integration produces unity of effort. Unity of effort, guided by unity of purpose, is a fundamental precondition for unity of action. Unity of action manifests itself as coherence, consistency, reliability, and responsiveness—the hallmarks of strategic effectiveness. Viewed otherwise, the resultant effect is more *strategic* bang for fewer *defense* dollars — the synergistic performance of a *system* operating at a level that exceeds the collective contributions of its component parts.

If we truly focus on system performance, we must face up to the realization that industrial integration cannot adequately be dealt with or pursued in isolation from operational integration. The purpose of the industrial base, after all, is to produce goods and services that meet operational needs. Each of these spheres of activity — the industrial and the operational — reflects the extensive differentiation by which any large system deals with the demands of the governing environment.

The challenge of integration is to synchronize these differentiated components. Ultimately the ease of achieving integration in either sphere will reflect and further contribute to integration in the other. Thus, if we sought improved effectiveness in coalition operations, we would strive for greater levels of national-supranational integration. Likewise, enhancing "jointness" would call for greater integration of the individual armed services. Such integration, in turn, could be expected to both affect and be affected by various forms of industrial integration. Why? Because the demands emanating from the operational side would tend, increasingly, to converge rather than diverge — thereby enabling the industrial side to concentrate and focus its efforts.

Making all this happen — that is, facilitating integration within each sphere while making the two spheres together mutually reinforcing — is the overriding future task for public and private management at all levels. The measure of how well we achieve such integration will be reflected in our ability to match operational needs; not simply to technological capabilities having concomitant commercial viability, but to total-system capabilities that effectively marry technology with doctrine, force structure, manpower, training and education, and logistics support.

Retooling Requirements Determination

The July 1993 report of the Defense Science Board (DSB) Task Force on Defense Acquisition Reform identified four issues that are central to the successful integration of defense acquisition and the commercial workplace. Two of these four issues tend to assume overriding importance: (1) major barriers that inhibit the use of commercial practices, facilities, and equipment for defense purposes; and (2) a lack of flexibility, reality, and affordability in the determination of "requirements." Because operational requirements provide the ostensible basis for establishing the military acceptability of commercial products and practices, it is important to deal with these two issues in consonance — starting with the more fundamental requirements determination process.[3]

According to the DBS, two root problems underlie the significant cost inefficiencies that typically originate in the requirements determination process: inadequate cost and value estimations, and instabilities produced by budget and requirements changes during the life of an acquisition program. The DSB attributes these problems to several major causes, including specifying technology needs rather than mission needs, over-specifying performance and design details, failing to take resource constraints and production and support considerations into early account, ignoring production price as an appropriate specification, and turning particular weapon systems into overly complex catchalls for disparate new technologies.[4]

---

3. Defense Science Board, *Report of the Defense Science Board Task Force on Defense Acquisition Reform* (Washington: Office of the Under Secretary of Defense for Acquisition, July 1993), 4-5.
4. Ibid., 5-6.

Acknowledging such dysfunctional practices forces us to recognize the interrelatedness of requirements generation, acquisition management, and planning, programming, and budgeting. What happens in any of these areas affects and is affected by what goes on in the others. For example, improving the specification of requirements might clarify acquisition choices but be constrained by contracting and purchasing procedures. Streamlining the requirements process might enhance the relevance and responsiveness of operational plans but be dependent on the quality of planning in other areas (e.g., forecasting technological advances or market behavior). Requirements, though seeming to exist in some purely objective sense, actually might have to be tempered by budgetary limitations.

Clearly there is a fundamental link between military commercial integration and the approach we take to determining operational military requirements. Correcting established practices, therefore, presumably would provide the flexibility, reality, and affordability necessary not only to rectify the program instabilities and inadequately considered cost-value tradeoffs that produce major cost inefficiencies in acquisition programs, but also to enhance the prospects for effective integration.

In attempting to deal with the more pronounced deficiencies of requirements determination, the DSB offers proposed reforms that simply tie the requirements process more closely to both the operational planning of the unified (joint) military field commands and the cost constraints of the long-term budgetary process. The DSB proposals, though useful, are little more than a call for more extensive, regular, and informed communications among the key players involved. They do not change fundamental institutional relationships or responsibilities, shift authority, or even call into question methods or approaches now in use. Most importantly, they do not focus sufficient attention on the conceptual underpinnings of the established process — either the relevance, adequacy, and defensibility of extant guidance, or the extent and manner of implementation.[5]

Matching Reality to Intent

Transforming the requirements determination process — and acquisition more generally — will depend in large measure on the current appropriateness and future potential of guidance already in place. A review of the major elements of guidance contained in the Defense Department's principal acquisition policy

5. The DSB's proposals include giving the unified commanders in chief (CINCs) and the Chairman of the Joint Chiefs of Staff (CJCS) greater roles in a requirements process now dominated by the armed services and the Office of the Secretary of Defense (OSD); establishing a closer working relationship and a freer exchange of information between the Joint Staff and OSD, and between the CINCs and the services; enhancing the ability of the CJCS to prioritize requirements; and providing added flexibility in making early value-price tradeoffs and in reassessing critical parameters — such as needs and implications — throughout the acquisition process. Ibid., 11.

directive offers useful insights into the most problematic features of current practice and thereby reveals important points of leverage for effecting change.[6]

Stated Guidance: Long-range planning will be based on best estimates of future fiscal resources.

The Problem: A commonly voiced criticism is that total life-cycle costs and future funding availability rarely receive adequate consideration at the front (requirements determination) end of the acquisition process. Only if there were but one way to interpret a need or define a requirement, and but one capability for meeting that requirement, would there be justification for disregarding such comprehensive fiscal computations. The failure to account for downstream operations, maintenance, upgrade, and replacement costs, especially in light of the uncertainties of budgetary politics, has the dual effect of distorting the calculus of affordability and foreclosing creative performance alternatives. A future likely to be marked by increased complexity and variety, and by demands for more prudent and disciplined spending, will necessitate more inclusive estimates that account for both fiscal and *non-fiscal* (e.g., human, natural) resources *and constraints* (e.g., demographic, political), as well as for changing and highly variable threats, conditions, and exploitable opportunities.

Stated Guidance: Mission needs shall be initially expressed in broad operational capability terms.

The Problem: More often than not, perceived mission needs are stated in rather narrow design terms. Thus, for example, the need for a mid-range battlefield interdiction capability is more likely to be translated immediately into a requirement for a new howitzer than to accommodate an array of possibilities that encompass direct or indirect fire, precision or area targeting, ground-or air-launched delivery, and guided or unguided, destructive or non-destructive, lethal or nonlethal munitions. It is even less likely that such a need would prompt a complete reassessment of interdiction as a requirement or of mid-range as opposed to short- or long-range capabilities. More effective future integration seems to call for an accentuation and expansion of this guidance — that is, for mission needs stated in broader, more flexible terms. This suggests a more discerning effort to identify commonalities among multiple missions and a more disciplined attempt to meet multiple missions with unitary capabilities whenever possible. In the case of interdiction, it would be imperative to determine the degree of commonality between interdiction and suppression, harassment, and pinpoint targeting, or between ground, naval, and aerial interdiction, and then to assess the potential and consequences of merging them into a single requirement that might be handled by a single capability.

6. Department of Defense, Directive 5000.1, "Defense Acquisition" (Washington, D.C., 23 February 1991).

Stated Guidance: A full range of alternatives must be considered before starting a new acquisition program.

The Problem: Established guidance specifies that non-materiel solutions receive first priority in meeting identified mission needs. This means not only that a reasonably exhaustive array of technological options be assessed but that changes in doctrine, force structure, manpower, training and education, and the like be thoroughly investigated before turning to technology. If, for example, a prospective adversary possesses an advanced targeting capability that potentially could be countered by a combination of greater operational dispersion, altered movement patterns, more sophisticated communications protocols, smaller unit configurations, or more concentrated training, these measures should be pursued — or at least fully addressed — as a preferred solution.

Once non-materiel alternatives are considered, extant guidance further prescribes that the following priorities be followed before initiating a new service-unique (e.g., Army) acquisition program: (1) use or modify an existing U.S. military system; (2) use or modify an existing commercial or allied system; (3) establish a cooperative research and development program with allies; (4) initiate a joint-service program. In practice, such priorities are honored more in the breach than in the observance. New service-unique programs tend to predominate, while non-materiel alternatives rarely receive detailed consideration worthy of their promise. Doctrine and force structure, in particular, are especially resistant to change. The failure to regularly explore non-materiel alternatives more fully and to follow a fundamentally sound scheme of priorities adds to the costliness of both individual acquisition programs and our overall defense posture. It also reflects a general lack of creativity in devising effective and affordable solutions to mission requirements. By the same token, the guidance as now stated — that a full range of alternatives be explored *before* starting a program — has the effect, if strictly followed, of inhibiting exploratory development that can accommodate unanticipated changes in the environment, unforeseen technological advances, or unthought-of design variants. The future calls for stricter adherence to the notion of exploring a fuller range of alternatives (especially non-materiel ones), while at the same time permitting greater flexibility in the timing of such exploration.

Stated Guidance: The acquisition process shall be structured in discrete phases separated by major decision points.[7]

The Problem: What was designed to be a principal strength of the acquisition

7. The life-cycle acquisition process consists of five sequentially ordered decision points, or milestones, and five intervening periods of time, or phases. Once there is a determination that a mission need exists, the following sequence of activities ensues: (1) Milestone 0 (Concept Studies Approval), (2) Phase 0 (Concept Exploration and Definition), (3) Milestone I (Concept Demonstration Approval), (4) Phase I (Demonstration and Validation), (5) Milestone II (Development Approval), (6) Phase II (Engineering and Manufacturing Development), (7) Milestone III (Production Approval), (8) Phase III (Production and Deployment), (9) Milestone IV (Operations and Support), (10) Phase IV (Major Modification Approval).

process — a sequential architecture that, by separating successive stages of program maturation by key decision points, seeks to minimize the risks and costs of error — has ironically proven to be a major weakness. This methodical process is supposed to lead to capabilities that repair operational deficiencies even as they provide means for supporting a given strategic posture. The reality is often quite different — in the vernacular of insiders, a "throwing it over the wall approach." Groups of specialists responsible for each discrete stage of the process work generally in isolation from one another, complete their piece of the overall effort independently, and then throw the result over the metaphorical wall that separates them from the next group in the chain. The barriers to communication, cooperation, and cross-fertilization that constitute these walls foster enmity, impede interaction, and produce go-no go decisions that frequently result in costly, time-consuming program revisions and reversals later on. If affordability, coherence, and responsiveness are to characterize acquisition in the future, the process must undergo a fundamental re-conceptualization and restructuring that provides (a) more regularized interaction among *all* parties to a program — developers, manufacturers, users, testers, trainers, logisticians — *throughout* the process; (b) an expansion of concurrent — as opposed to sequential — planning, decision making, and execution among the various stages of the process; and (c) the adoption of a two-directional approach that emphasizes "technology-push" — the exploitation of commercially viable technological advances through adaptations in missions and requirements — in equal or greater measure than traditional "mission-pull" — the seemingly straightforward translation of purportedly objective requirements into capabilities.

The first two of these proposed changes already have found their way into what some reformers have dubbed Integrated Product and Process Development — an increasingly visible concept undergoing experimental application in selected programs such as the F-22 Advanced Tactical Fighter. The third proposed change — adapting to the push of technology — has penetrated the consciousness of the acquisition community and is being explored, albeit tentatively, in applications ranging from robotics to flat-panel displays.

Stated Guidance: Acquisition strategies shall be tailored to accomplish program objectives and control risk.

The Problem: In the abstract, it is hard to quarrel with the common sense notion of pursuing approaches tied to established objectives and designed to control risk. However, when the governing objectives are mere program objectives that may or may not complement higher order operational or strategic goals, and when these program objectives almost invariably focus on *military* to the exclusion of non-military ends, on *materiel* to the exclusion of non-materiel solutions, and on *performance* to the exclusion of other important desiderata (such as time or affordability), there is ample room for sub-optimization, waste, and inefficiency.

By the same token, establishing the control of risk as an overriding criterion

of choice, though seemingly prudent from the standpoint of accountability, nonetheless can have the unintended and unwanted effect of breeding rigidity and undue caution. Alternative criteria, such as "exploiting innovation" or "multiplying advantage," seem to offer preferable bases for action in the sort of fluid, demanding environment the future promises. To the extent, though, that such proactive criteria carry a higher degree of risk, there will be an associated imperative to institutionalize a comprehensive, disciplined methodology for comparing and selecting program alternatives. At one level, this would mean giving more assiduous attention to total-system tradeoffs in which prospective technological solutions compete with non-technological changes in doctrine, force structure, manpower, training and education, and logistical support. This could mean tethering our technological impulses in favor of more imaginative operational alternatives. But it also could mean being more astute in identifying technological advances capable of catalyzing doctrinal and organizational transformation.

At a second level, there would be a need for more inclusive technology performance tradeoffs among the full range of parameters relevant to a particular technology: speed, range, lethality, accuracy, and the like. Thus an advanced tank design might be compared not simply to another tank but to a markedly different alternative consisting of multiple lightweight, single-operator, all-terrain vehicles equipped with precision beam weapons — in which case numerous performance parameters would have to be weighed against one another to determine which system has the most to offer.

A third level of analysis would necessarily bring into play specific design tradeoffs among considerations such as size, weight, configuration, comfort, and appearance — factors that, though recognizably important, are not likely to be show-stoppers. Finally, there would be the ultimate need to trade off performance against design, expected life-cycle costs, and schedule. Although trade-off analyses are regularly incorporated into the existing process for determining requirements and translating requirements into capabilities, the question is whether the approach commonly employed is sufficiently thorough, systematic, and consistent to facilitate the quality of decision making the future will demand. The available evidence suggests not.

Some Imperatives for Change

In highlighting the strengths and weaknesses of established acquisition guidance, the foregoing problems define several imperatives for change that will be absolutely necessary for the achievement of both a more streamlined acquisition process and a more effectively integrated industrial base.

Imperative 1: From Requirement-Driven to Capability-Driven.

In the real world, technological advances frequently do influence the perceived nature and importance of "requirements." This is because (a) we cling to a relatively static conception of war and its essential instruments, and (b) scientists, engineers, and business executives are on a perpetual quest to extend

the performance of those instruments. Our field of vision and our sense of requirements, in other words, are quite limited. Nonetheless, it is a central feature of prevailing orthodoxy that there are objective requirements that determine the capabilities one must have. During the Cold War, such a stance was fairly defensible since we thought in terms of an advanced, more-or-less monolithic threat that demanded mirror response. Now that we can no longer hide from the infinitude of possibilities we face, we also can no longer deny the inherently subjective nature of requirements or the ambiguities of translating requirements into capabilities. Why, for example, do we think there is an obvious requirement for battleships and land-based intercontinental ballistic missiles, but not for mind control or weather modification technologies? Can an advanced armament in the hands of a prospective adversary be countered only by a like armament, or might we be better served by enhanced capabilities for target detection and acquisition, communications disruption and interception, or maneuver and concealment? Alternatives are irrelevant, of course, if one cannot imagine their possible existence. The future, therefore, may well demand an acquisition process based less on deriving capabilities from requirements than on translating a fuller appreciation of available technologies into the more sophisticated framing of requirements and solutions.

Imperative 2: From Technology-Centered to System-Centered.

The acquisition process centers almost entirely on technology as a stand-alone capability, rather than on either front-end non-materiel alternatives or back-end total-system performance. The failure to adequately consider non-materiel alternatives severely limits the range of potentially cost-effective solutions, while the failure to focus on overall system performance — the fusion of technology with operator proficiency, doctrine, and support infrastructure — frequently produces inadvertent strategic vulnerability through over-reliance on technological solutions. Such over-reliance reflects seemingly contradictory impulses with remarkably similar consequences. On the one hand, impatience with the technological status quo and an infatuation with gimmickry may be largely responsible for fueling economically debilitating arms races. On the other hand, resistance to the institutional, doctrinal, and procedural adaptations required to effectively exploit accelerated technological turnover stimulates two things: (1) demands for economically constraining export controls to preserve fleeting technological advantages, and (2) countervailing calls for expanded arms markets abroad to protect U.S. manufacturers intent on continuing business as usual. In the future, we should seek not simply technological advantage but *comparative operational advantage* — not simply a transitory, frequently marginal, sometimes illusory technological edge, but a total-system edge. The measure of advantage, rather than being some false uniqueness, autonomy, or self-sufficiency, such as we have historically sought through technology, will be our ability to achieve faster overall system integration than others. Technological turnover will continue to accelerate, and economic pressures will accentuate the diffusion of technology. Advantage then will depend on such things as more

frequent and dynamic adaptation of doctrine and force structure to new technologies — even to the point, for example, of turning military units into virtual organizations whose elements are linked only to perform particular missions or tasks.

Imperative 3: From Spin-Off to Spin-On.

Traditionally we have viewed commercial applications as acceptable, even if accidental, by-products of military developments. Today there is growing recognition of the value, even the desirability, of the opposite: deriving military applications from commercial developments. As economic security, growth, and vitality assume greater primacy in our strategic posture, there will be a greater impetus and justification for pursuing this approach more systematically. Moreover, if we become accustomed to market forces as a suitable quality-control alternative to design specifications, this approach will become more palatable. One example, from among many that could be cited, of an inchoate technology being developed for commercial markets that could have valuable military uses is the computer-based speech-translation system (or universal translator). Although there are innumerable commercial possibilities for such a technology — international telephone services or television programming, for example — speech-translation devices also could enhance the command and control of multinational military operations or affect the personnel and training requirements of an ethnically diverse national force.

Imperative 4: From From-Scratch to Off-the-Shelf.

We also have shown a consistent penchant for new-development items in lieu of commercially available ones. What we have thereby sought in newness and uniqueness, we have frequently lost in costliness, delay, and obsolescence. The prevailing notion that everything must be developed from scratch feeds on and further breeds a general ignorance of the marketplace. This is analogous to our approach to intelligence, where an obsessive preference for classified information blinds us to open-source material that may be more accurate, timely, available, and affordable. In the future, we will have to operate as savvy consumers who are fully aware of what is available throughout the marketplace and on the horizon, what works best, and what offers the best price.[8]

Imperative 5: From Product-Oriented to Market-Oriented.

Guided by our essentially static conception of war and the proper tools of war, we have tended to define needs and solutions in isolation from the prevailing dynamics of the marketplace. If we are to reap the benefits of future

8. An example of how off-the-shelf items can be explored and exploited to future advantage was a recent three-year "Soldier-Integrated Protective Ensemble (SIPE)" program conducted at Fort Benning, Georgia. Seeking to demonstrate that off-the-shelf equipment could enhance the capabilities of individual infantrymen, SIPE produced a prototype soldier equipped with a computer, a heads-up video display for seeing around corners, a tiny air-conditioning system for the uniform, better body armor, and a digital radio.

state-of-the-art advances, we must permit ourselves to be guided in greater measure by marketplace developments. A somewhat ambiguous example of this — but one sure to be instructive as it plays out — is the Pentagon initiative to subsidize the creation of a viable domestic industry in flat-panel display technology capable of capturing 15 percent of a world market now almost totally dominated by the Japanese. In this particular case questions of strategic vulnerability and economic competitiveness seem to be exerting a material influence on military "need-driven" demand.

Imperative 6: From Design-Based to Performance-Based.

Another reflection of our deeply ingrained conception of war, exacerbated by the turf-protective parochialism of the armed services, is our enduring tendency to focus more on design than on performance. Thus, for example, there is always pressure to acquire more-advanced tanks, rather than an alternative that could do what tanks do. Tankers and the Army see to that. So is there eternal pressure to acquire more-advanced submarines, rather than something else that could accomplish the same thing. Submariners and the Navy make it ever so. The future demands that we take control of tradition, that we wean ourselves from the narrow design focus that attends our immutable sense of war and its instruments and let ourselves be guided instead by larger performance considerations. Non-lethal technologies are a perfect example of an emerging family of weapons that have garnered increasing visibility because of their performance potential but have yet to gain widespread acceptance and support because of their heterodox nature. The idea that we might be able to do with combustion alteration, liquid metal embrittlement, or infrasound what lethal weapons do is largely anathema to traditionalists. In contrast, electric cars represent an experimental technology that has generated some receptivity from those who see benefits to noiseless, pollution-free, oil-independent vehicles that could slip almost silently over enemy terrain immune to infrared detection.

Imperative 7: From Price-Determined to Value-Determined.

"Best-value vs. low-price" is a widely accepted concept but an infrequently realized practice. For one thing, price is an immediately visible, ostensibly objective measure of how responsibly the government is handling the public's money. This is especially so when price is bid price, and bid price is tied directly to initial production cost rather than to total life-cycle costs. Value, in contrast, is an inherently nebulous notion tied more to worth or utility than to cost. Its principal measure — the price consumers are willing to pay in a competitive commercial marketplace — is one in which government purchasers tend to have little confidence. Yet there is ample evidence that marketplace competition produces greater cost efficiencies and thus a purer measure of value (including the consumer's sense of life-cycle quality) than cost-based pricing. The future demands that we move away from the established approach to procurement, based essentially on low (bid) price with acceptable performance, to one based on best performance with acceptable (fair market) price.

Imperative 8: From Fixed/Specific to Exploratory/Open-Ended.

Detailed guidance is commonly viewed as a useful managerial control mechanism for measuring progress and compliance. Moreover, well-defined program specifications are typically considered necessary for allocating and appropriating public funds. Unfortunately, what appears to serve the purposes of managerial prudence and fiscal accountability often inhibits programs from adapting to rapid technological change and requirements uncertainties. Consequently, there is a pronounced need for an approach based on more flexible, open-ended program guidance and for more exploratory methods capable of adapting to changing conditions and exploiting new opportunities rapidly and affordably.[9]

Imperative 9: From Risk Management to Innovation Management.

The risk management associated with the established acquisition process frequently tends toward risk avoidance — a refusal to take the initiative or pursue novel courses of action. This has been especially true for militarily unique technologies. Although the slowness and costliness of acquisition sometimes have been attributed to our unrequited quest for quantum technological advances, in fact we have been singularly partial to incrementalism in exploring fundamental military requirements and solutions. The predictably turbulent and uncertain future ahead demands a radically different approach in which we seek strategic advantage by *managing innovation* — that is, by systematically pushing the leading edge of commercially viable technologies, creatively adapting those technologies to military uses, and accelerating the obsolescence of militarily unique items. For example, there is growing interest in the potential that atmospheric hypervelocity systems — rail guns, hypercannons, coaxial launchers, ram accelerators — offer for rendering gunpowder obsolete. At the same time, some authorities argue that more sophisticated directed energy systems — such as lasers and particle beams — are far from being mature enough for operational applications in the foreseeable future. Yet these latter technologies offer more obvious commercial possibilities than hypervelocity systems, as well as more concomitant potential for hastening the obsolescence of various militarily unique technologies. An emphasis on managing innovation rather than risk, therefore, might argue for leapfrogging further development of hypervelocity systems in favor of an all-out directed energy program.

Imperative 10: From Uniform to Tailored Requirements and Capabilities.

Finally, there is a vital strategic imperative that runs generally counter to integration. Integration operates in general opposition to institutional and organizational differentiation. Differentiation is about specialization and uniqueness, while integration entails uniformity or commonality — as might be

9. The embryonic Joint Advanced Strike Technology (JAST) program exemplifies such an exploratory approach that could lead to the next generation of tactical combat aircraft. However, as such, it has drawn fire from critics in and out of uniform who are skeptical of unfocused "hobby shop" or "science fair" initiatives that do not begin with a well-defined end product.

the case, for example, if a single aircraft or computer language could meet multiple needs in a variety of areas. Historically the individual armed services have favored requirements and capabilities that are service-unique but operationally general purpose. Even during the Cold War, though, when the likelihood of facing similarly armed threats around the world was much greater than it will be in the future, our biggest strategic failings resulted from our insensitivity to situational variables. Strategic necessity makes it imperative that we tailor our future requirements and capabilities to strategic rather than bureaucratic imperatives — that is, to the specific geographical, climatic, demographic, and cultural peculiarities of the world's regions. Such tailoring, though antithetical to accepted notions about economies of scale, nonetheless would mirror developments in the commercial marketplace and underscore the importance of agile manufacturing methods to effective integration.

Toward Total Commercialization?

Renovating the requirements determination process in the manner suggested above would heighten the prospects of placing more confident reliance on commercial capabilities to meet military needs. Is there a limit, though, to how far we can prudently go in this direction without sacrificing military and strategic effectiveness? The answer is unclear.

Because the move toward commercialization has been the centerpiece of acquisition reform thus far in the Clinton Pentagon, there is little new to be said on the matter. On the whole, the principles contained in Secretary of Defense William Perry's February 1994 report to both houses of Congress, "Acquisition Reform: A Mandate for Change," seem to provide a sound basis for exploring the limits of commercialization. Mr. Perry articulates the necessity of measures the Pentagon subsequently has sought to put in place: increasing the purchase of commercial products, adopting commercial practices wherever possible, and seeking legislation that would alleviate impediments to integration by protecting cost and pricing data, preserving proprietary technical data, relieving burdensome statutory requirements, overhauling auditing and quality control methods, and substituting commercial for military specifications and quality standards.[10]

The real crux of the issue — the extent to which commercial capabilities can be expected to fulfill military needs — is the question of militarily unique requirements and specifications. Mr. Perry has stated that, as a matter of principle, the Defense Department "must preserve defense-unique core capabilities such as submarines, armored vehicles, and fighter aircraft." Such deeply institutionalized views impel us to ask (a) whether there actually are militarily

10. William Perry, "Acquisition Reform: A Mandate for Change," *Defense Issues*, Vol. 9, No. 10 (Washington, DC: Department of Defense, March 19, 1994). The 1995 Defense Appropriations Act contains major procurement reform provisions that encourage federal agencies to buy more items off the shelf, in routine commercial transactions, rather than negotiating the purchase of items custom-designed to government specifications.

unique core capabilities (and requirements and specifications) that must be preserved, and (b) whether the military is able and willing to aggressively pursue creative alternatives that would effectively eliminate or minimize such demands.

There are no easy answers to these questions. Obviously requirements that can only be met by uniquely military capabilities will impose practical limits on the commercialization that can be achieved. Even if we could eliminate these unique military demands, there still would be understandable bureaucratic resistance to the very idea of extensive commercial reliance. Such skepticism reflects enduring concerns — perhaps justified, perhaps not — about the ability of commercial products to meet military quality standards and of commercial sources to respond reliably to emergency surge demands. Neither of these perceived problems, though, is insurmountable. They may not even be particularly troublesome if we permit the quality-control forces of open competition to operate, make more knowledgeable use of recognized commercial quality standards, and ensure the collaborative involvement of expert operational testers and evaluators throughout the acquisition process.

If we start from the premises that integration contributes to strategic effectiveness and commercialization increases the likelihood of integration, there is a reasonably compelling justification for seeking greater commercial reliance. Our ability to accomplish this successfully, though, could well depend on our willingness to adopt new operating principles: *accelerated product replacement*, for example, to accommodate rapid technological turnover in the marketplace; or priority attention to commercially viable technological developments that offer potential for the *selective elimination* of militarily unique items.

Reorganizing for Success

Ultimate success in achieving acquisition reform will require a complete cultural transformation throughout the acquisition community. In the final analysis, integration is more than rules, procedures, or techniques; it is a state of mind. To achieve integration, we must think integration. To think integration, we must establish organizational structures that facilitate, nurture, and require such thinking. In the end, our objective must be to produce a newly oriented nucleus of "brilliant" users, buyers, sellers, and testers who have both a thorough, sophisticated understanding of their own fields and a greater appreciation of the needs, possibilities, and constraints of their counterparts.

The current problems that inhibit integration are largely attributable to organizational arrangements and cultural underpinnings that combine Cold War attitudes and traditional bureaucratic precepts: secrecy, compartmentation, specialization, hierarchical authority structures, routinization, and rule-based decision making. True jointness among the armed services remains more facade than reality. True power — and most authority — continues to reside with the individual services. Added fragmentation results from enduring strains between the military and civilian sides of the Defense Department (DoD). These strains are mirrored outside the Pentagon as well, in the form of long-standing

battles between DoD and other agencies over export control, technology transfer, and research and development.

There is no national-level focal point for managing the full range of scientific, technological, and industrial matters that determine the health of the industrial base. The Advanced Research Projects Agency (ARPA), though increasingly charged with dual-use technology initiatives, remains under DoD purview. The federal laboratories, oriented as they historically have been on nuclear and other defense matters, possess little business or entrepreneurial acumen. Government-industry relations remain generally adversarial at the institutional level, reflecting great ignorance by each party of the other and deep-seated ideological disagreements over free-enterprise economics and central industrial policy.

Finally, there is no organizational infrastructure at the supranational level to facilitate integration. This is true even at NATO, where alliance rationalization, standardization, and interoperability have been a subject of extensive discussion for many years. Greater future reliance on multilateralism will require a supporting institutional framework for industrial coordination and cooperation.

Fundamental organizational reform must confront these issues head on and encompass the four major activities associated with acquisition: *technology management, requirements determination, acquisition management, and procurement and purchasing*. Moreover, integration measures necessarily must be instituted at three levels: (1) within DoD itself, where the objectives would be to overcome dysfunctional conflict between the various parties involved in acquisition and to shift power and authority from the services to the Joint Staff and the combatant commands; (2) at the national level, where the objectives would be to achieve strategic coherence, rational and responsive national resource management, and an improved ability to concentrate and project power; and (3) at the supranational level, where filling the extant conceptual and institutional void would seek to enhance multilateral burden- and opportunity-sharing and to produce more effective coalition operations.

A reorganization scheme that would both elevate the importance and impact of technological initiatives and provide an improved structure for technology management might have the current White House Office of Science and Technology Policy converted into an Office of Science, Technology, and Industry (OSTI). OSTI would continue its presidential advisory and policy guidance functions and assume a broader operational role by absorbing ARPA, the Commerce Department's National Institute of Standards and Technology, and NASA's network of technology transfer centers. ARPA would be responsible for managing a more streamlined, coherent, and focused system of national laboratories. The laboratories would be functionally organized along critical technology lines, with some degree of overlap to foster competition. They would be responsible for organizing and overseeing government-industry-education consortia to pursue next-generation dual-use technology breakthroughs; and they would house teams of expert "technology advocates" or "technology transfer brokers," who would be tasked with translating technological advances into high-impact commercial and military applications.

In the area of requirements determination, there would be requirements oversight councils at the DoD, national, and supranational levels charged with establishing, reviewing, validating, revising, and determining conformance with requirements and performance baselines. This would ensure that the coordination of requirements is a matter of strategic, not just military, concern.[11]

Acquisition management would be handled by acquisition boards at all three levels. Each board would be responsible for providing consolidated oversight and issue-resolution for major acquisition programs at its level. Now there is only the Defense Acquisition Board (DAB). The service acquisition executives who serve on the DAB would be replaced by functional (air, land, sea) joint acquisition executives from the Joint Staff. They would have counterparts on the staffs of each unified command. Program managers for each acquisition program would be functional specialists reporting to the Joint Staff, thereby facilitating the integration of acquisition with operations.[12]

Overall planning, guidance, agenda- and priority-setting, and coordination in the area of procurement and purchasing would fall to consolidated procurement agencies at the DoD, national, and supranational levels. Decentralized execution would be in the hands of procurement arms at each unified command, which would replace current service procurement commands.[13]

Because of the fundamental importance of education and training in re-acculturating the acquisition community and shaping future thinking, the Defense Acquisition University (DAU) would be expected to play a central role. The DAU would therefore have to be integrated more fully into the military's professional education system. The University would be charged with (a) administering the effective integration of acquisition, economics, logistics, mobilization, and industrial base studies into the curricula of the otherwise operationally oriented professional military schools; (b) instituting a comprehensive government-industry exchange program that would provide more extensive opportunities for military and industry representatives to acquire first-hand experience in the working environment of the other; and (c) taking the lead in creating a viable network of civilian and military educational institutions with

11. At present there is only one such body: the Joint Requirements Oversight Council (JROC), chaired by the Vice Chairman of the Joint Chiefs of Staff and consisting of the vice chiefs of staff of the Army and Air Force, the Vice Chief of Naval Operations, and the Assistant Commandant of the Marine Corps. This body would be replaced by a new JROC composed not of the service vice chiefs but of the deputy commanders in chief of the unified commands, thus underscoring the importance and reaffirming the legitimacy of jointness and regional command priorities.
12. The DAB is the issue-oriented formal oversight mechanism for major defense acquisition programs. Chaired by the Under Secretary of Defense for Acquisition, it includes the Vice Chairman of the JCS as vice chairman, the Deputy Under Secretary of Defense for Acquisition, the question executives from each of the armed services, the Defense Department comptroller, and others. The DAB deals with such issues as cost growth, schedule delays, test and evaluation highlights, and the like.
13. A prospective model for reposing such activities in the combatant commands is the U.S. Special Operations Command, which already has its own acquisition executive and acquisition center.

programs in industrial and technology management, manufacturing, acquisition and logistics management, and the like.[14]

Postscript for the Future

It is a peculiar irony of the world we now face that strategic and industrial performance are more symbiotically linked than ever before. Although big wars may have gone the way of the dinosaur, industrial responsiveness and adaptability assume a premium in an age of global transparency and proliferating resource demands. America's ability to effectively integrate the country's industrial base will be instrumental in determining whether we retain the presumptive status of superpower or become just another industrial-age has-been.

14. The Defense Acquisition University is a consortium of Defense Department education and training institutions and organizations that provide acquisition courses for military and civilian acquisition specialists. Member institutions include the Industrial College of the Armed Forces, the Defense Systems Management College, and the Air Force Institute of Technology, among others. Authorized by 10 U.S.C. 1746, the DAU began operations 1 August 1992.

The Georgetown Compass

celebrates the 75th Anniversary
of the School of Foreign Service

The Georgetown Compass, a journal of contemporary international affairs, invites you to share in the study of foreign policy and international relations, with the graduate students, faculty and practitioners of Georgetown University's School of Foreign Service.

ORDER FORM

For Individuals:

_____ $15 one year
_____ $25 two years
_____ $35 three years

For Institutions:

_____ $25 one year
_____ $45 two years
_____ $65 three years

For foreign subscriptions, please add $15 per year.

Name_____
Institution _____
Address _____
City/State _____
Country _____
Postal Code _____
Home/Work Telephone Number _____
Amount Enclosed _____

Please enclose a check made payable to Georgetown University with this order form and send to:

The Georgetown Compass
7th Floor, Intercultural Center
School of Foreign Service, Georgetown University
Washington, DC 20057
Phone (202) 687-5256 / Fax (202) 687-5116

FF94