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JL
AIR FORCE JOURNAL of LOGISTICS
Volume XXVII, Number 1
Spring 2003

Agile Combat Support

Supporting the Fleet in the 21st Century

Evolutionary Acquisition and Logistics

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EA Challenges

The New Mentality—Reality-Based and Evolutionary Acquisition

The Air Force acquisition world has been turned upside down. The traditional, bureaucratic rules have been tossed aside, and a new *if it isn't against the law* mentality rode into town. Does this environment portend a return to the days of the Wild West and a scenario where every program does as it darn well pleases? Of course not. But, in a recent policy letter, Dr Marvin R. Sambur, Assistant Secretary of the Air Force, tried to instill a sense of urgency and innovation from the acquisition community with a battle cry for ushering in a new emphasis on Reality-Based Acquisition. Under his vision, there are two overarching goals: "to shorten acquisition cycle time and to gain credibility within and outside the acquisition community." Toward that end, a list of commander's intent statements accompanied these goals, the first of which stated, "Program managers will ensure full compliance with the law; however, overrestrictive implementation that goes beyond what is required in statute must be challenged." Dr Sambur's policy letter also prescribes Evolutionary Acquisition (EA) as the "preferred strategy for achieving the commander's intent."[1]

At its core, Evolutionary Acquisition is strategy based on the delivery of needed requirements by providing successive increments of increasing capability. Its bottom line is to shorten the acquisition cycle by incorporating mature, quickly garnered technologies to produce an initial capability, then increasing the system's capabilities in

subsequent increments over time. It provides the warfighter an improved capability, at a much quicker pace. In addition, it enables the United States to continue striving for the best, in increments, without depending solely on aging systems and outmoded technologies while waiting for a quantum leap or *big bang* (Figure 1). The process that builds this capability within each increment is called spiral development. The overall goal is to decrease acquisition response time in a 4:1 ratio by delivering new warfighting capabilities in about 5 years.

Taken together, the incremental deliveries under an EA strategy, coupled with the spiral development process, are designed to deliver useful and supportable technology to the warfighter faster and more reliably than the traditional single-step-to-full-capability acquisition approach.

Impact on the Support Community

Does this new mentality impact product support, logistics, and sustainment?[2] You bet. In some very important respects though, basic requirements are still the same for the sustainment community. Anytime a weapon system or product is delivered to the field, it must be fully supportable, as if it were the final delivery of the system. It does not matter if it was the result of a faster acquisition process. Nor does the fact it is being delivered in increments, rather than a full-up final version, change this dynamic. A weapon system delivered to the field without support capability is little more than a static display. Lieutenant General Michael Zettler reinforced this necessity during a panel session at a recent conference:

> I have no trouble with the program manager who is out there with a product put together to deliver a capability and to break a lot of paradigms along that path. I have a lot of trouble, though, when we just say throw out all the rules because I've got to make sure that what you field is supportable at Khandahar and Bagram and other places around the world like that. Or even at places like Seeb, where we've been operating a few years, or Prince Sultan Air Base. And it has got to be operated by a young man or woman with a high school education and 6 weeks of basic training, and 20 weeks of technical training, and 4 weeks of field training on that specific platform. And it has got to be worked. And he's got to have books to work it by. And he's got to understand it. And yes, we'll put some technical assistance out there in the form of contractor experts. And that's fine for platforms that are in very small numbers, but when you start to develop and field multiple systems and multiple squadrons of those systems, that's got to be supportable. It's got to work within the system. We've got to have the capability to have young men and women take care of it. And it's got to be reliable enough that the warfighter when he says go do it, it goes and does it.[3]

While some basic truths never change, Evolutionary Acquisition does, at the same time, pose major new and unique challenges for the support community. Planning can be more complex when attempting to support multiple increments, rather than one final delivery. The issues of configuration control and interoperability rise rapidly to the forefront of the planning effort, as incremental introduction of warfighting capability increases the chances of multiple versions of weapon systems being in use simultaneously. Proper planning should allow for a much more structured approach to configuration management, which should, in turn, mitigate the risks associated with multiple versions and interoperability. Ensuring full-up support capability is garnered more rapidly to match the quicker delivery of a weapon system operational capability is also among the most

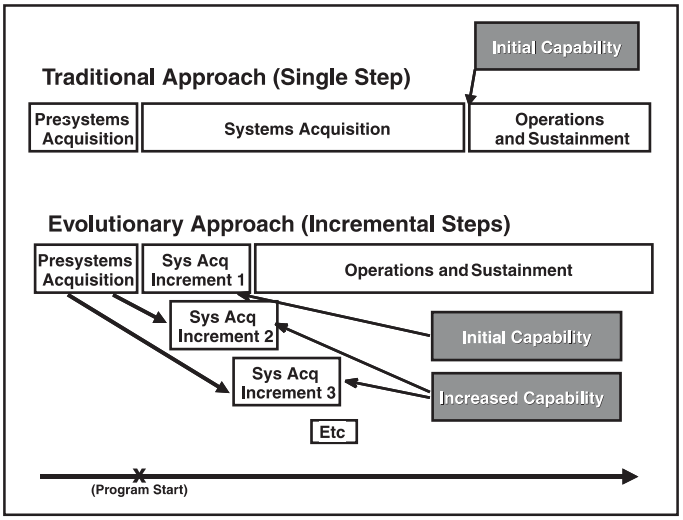

Figure 1. Traditional Versus Evolutionary Approach

basic of those challenges. For these reasons, thorough logistics support planning and finely tuned, integrated, and coordinated support execution are even more important than in the past.

Taking on the Challenges of Evolutionary Acquisition

How does the support community approach and overcome these challenges? More specifically, what can the support planner do to ensure each increment can be immediately and fully supported, despite greater complexity? The bad news is there has been little official guidance offered to this point on supportability planning for Evolutionary Acquisition. The good news is that the lack of official guidance leaves plenty of room for innovation and flexibility. Further good news is that logisticians already have been preaching and practicing a basic framework for years, which can enable success, even in this changed acquisition environment.

Logisticians have always understood that up-front sustainer involvement enhances an acquisition program. When brought in early enough, support planners can offer design recommendations that ensure a weapon system is more easily supportable at a reduced total life-cycle cost. Unfortunately, in the pre-EA days, early and active sustainer involvement was not always a priority, as there often seemed to be more pressing needs. After all, in the old paradigm, the need to support the system was still many years away. Under EA's quicker delivery of systems, however, early sustainer involvement becomes imperative. If the weapon system is to be operated and supported sooner, then detailed support planning must be integrated with overall system planning at the earliest stages—even in the first initial capabilities documents and capabilities development documents developed by the warfighter.

To offer the best advice to the warfighter, the product support planners must keep attuned to the latest support concepts, technology advances, and availability. A good support planner will be aware of products already on the market or included in other weapon systems that can be integrated quickly to enhance the support of the proposed weapon system. They will also comprehend the status of logistics and product support research in the Air Force Research Laboratory, as well as the latest policy

initiatives in Air Force Materiel Command, Air Staff, and Department of Defense (DoD) logistics. Based on this knowledge, the support planner must be able to provide the warfighter with advice on what can be procured quickly from the support perspective and what the impact will be on the warfighter. There may be products readily available that can reduce or obviate the need for some traditional support but require a larger initial investment. The warfighter needs to be provided with those options. On the reverse side, it is possible a system can be delivered rapidly under Evolutionary Acquisition, but the supply chain cannot be made ready to support it soon enough. Again, the warfighter must be informed of the constraints and tradeoffs, along with feasible alternatives. In any case, the product support professional must balance the need for agile acquisition with the absolute requirement of Agile Combat Support at the operational base or the deployed environment, because systems procured quickly are not worth the effort if they cannot be supported.[4]

The decisions made, actions planned, impacts anticipated, and costs projected should ultimately be spelled out clearly in a product support management plan (PSMP)[5] and appropriately included in the Single Acquisition Management Plan (SAMP) for the weapon system. Only by doing so, can milestone decision authorities, acquisition strategy panels, and Air Force corporate review panels adequately assess the proposed system of systems to ensure the warfighter can be satisfactorily supported before approving progression into subsequent phases of the acquisition process. The PSMP should be reviewed, updated, and approved at program decision reviews for increments that change significantly from the approved baseline.[6]

ILS Elements and Evolutionary Acquisition

Another traditional framework—Integrated Logistics Support (ILS)—remains very useful for ensuring the full range of support is considered and included, especially in the more complex EA environment. The ten ILS elements separate the logistics chain into manageable chunks. Maintenance planning; supply support; design interface; packaging, handling, storage, and transportation; manpower and personnel; support equipment; technical data; training and training support; facilities; and computer resources support comprise those elements, as depicted in Figure 2. The process of ensuring a weapon system is fully supportable includes appropriately addressing, integrating, and balancing each of these elements. In the following paragraphs, we will examine each of the ILS elements individually and briefly consider their unique impacts on a program using an EA strategy. These characterizations will not be exhaustive or comprehensive; instead, they will be a summation of some of the key points for actual program teams to consider in developing alternative support strategies in an EA environment.

Maintenance Planning is the process of describing requirements and tasks to be accomplished for achieving, restoring, or maintaining the operational capability of a system, equipment, or facility. The maintenance concept employed under Evolutionary Acquisition is not limited to any predetermined subset of those available to traditional acquisition programs. However, with the planned, methodical progression from the first increment to the last, the selection of two versus three levels of maintenance, the provider of base-level maintenance services for new and peculiar items, and the Source of Repair Assignment Process (SORAP) recommendation for the provision of depot-level maintenance take on added elements of complexity. Alternatives range from interim contractor support (ICS) for short periods, contractor logistics support (CLS) for longer periods, organic support, or public and private partnerships, whichever combination makes the most economical and mission support sense. It is important to recognize that the complexities of multiple increments do not necessarily drive the default decision toward using a contractor as the maintenance provider. Any potential contractor must face the same complexities, and as such, it may prove to be cost prohibitive to contract for such services. That said, only after a thorough repair level analysis (RLA) is completed will it be clear whether the maturity, stability, and complexity of the system design is appropriate for a contractor-provided maintenance scenario over that of an organic source.

Supply Support planning is used to acquire, catalog, receive, store, transfer, issue, and dispose of items to meet the user's peacetime and wartime requirements. In an EA environment, a supply support for the initial increment is likely to be provided through an ICS structure, without necessarily putting all the required supply management data interfaces in place. After the initial increment, the single manager will need to consider whether the priority of the mission, mission requirements, and date the increments need to be in operation can be met through normal organic provisioning processes, further interim contractor logistics support (using the Reformed Supply Support Process), or permanent contractor logistics support. Supply support may become more standardized and organically provided as the program moves to subsequent increments, the design stabilizes, and operational usage increases. Unique processes should be minimized with subsequent increments.

Design Interface integrates logistics-related readiness, combat capability, and supportability design parameters into system and equipment design.[7] This element is often an overlooked element, yet it is far and away the most powerful one. By leveraging support considerations into system design, the greatest influence is made on logistics support, life-cycle cost, and the ability to carry out sustained warfighting missions. If spares and support equipment are to be more common, the system must be designed that way. If the new components are to be more reliable than their predecessors, they must be designed that way. If maintenance is to be simplified, the system must be designed that way. Evolutionary Acquisition provides greater opportunity for driving weapon system capability improvement into designs, as the system design is programmed for change more often. If not planned properly, however, the potential for significantly greater life-cycle costs exists, if each increment drives costly changes to the existing logistical infrastructure. Historically accepted estimates tell us that, once designed, as much as 70-80 percent of a system's total life-cycle cost is predetermined. To accommodate multiple increments under Evolutionary Acquisition, the initial design should, therefore, be as reliable, flexible, adaptable, scalable, supportable, and transportable as current technology allows. Under an EA strategy, the opportunity to improve reliability on a fielded system happens much sooner and more often in a program as design changes with each

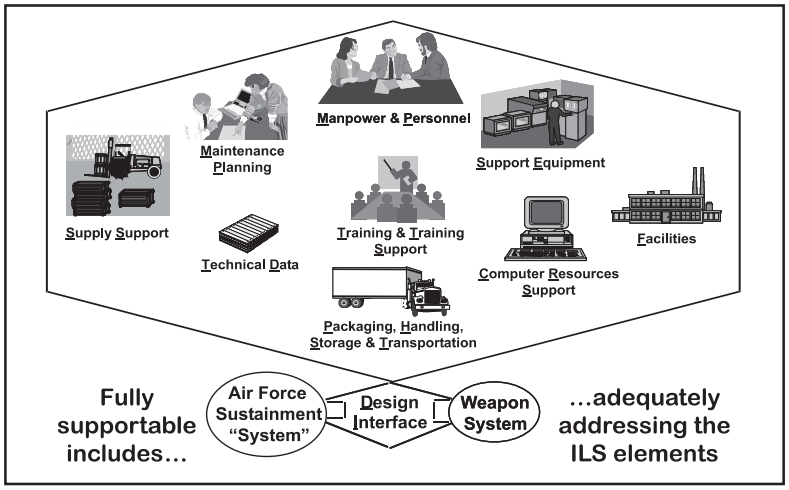

Figure 2. Then Ten ILS Elements

increment could lower total ownership costs, as well as improve operational performance.

Packaging, Handling, Storage, and Transportation (PHS&T) planning determines environmental, preservation, storage, and transportability requirements and methods to ensure elimination or minimization of damage to the system or support infrastructure. Transportability is a design consideration to ensure all system equipment and support items can be delivered to the battlefield or the point of operational use effectively, efficiently, and safely. Under Evolutionary Acquisition, earlier delivery necessitates earlier transportability analysis. Operational delivery and use of the system in the earlier phases of development, combined with the greater likelihood of contractor inventory control points and other support infrastructure differences, impact transportation decisions. As a result, the program office must contact and work with its center's transportation specialist much earlier in the program, long before any operational use or movement is considered. In addition, PHS&T requirements will need to be reevaluated for each increment to determine if any new or unique needs must be met. Numerous configuration changes (physical, weight, dimensions, hazardous material, security classification or item fragility changes), possibly resulting in new national stock numbers, will also impact PHS&T and transportability analysis. With multiple configurations possible, the number of container and packaging designs and the importance of clear label marking and total asset visibility increase significantly. Since sound PHS&T elements are vital in both peacetime and contingency operations, system designs should specify maximum mobility footprint parameters.

Manpower and Personnel planning identifies and acquires military and civilian personnel with skills and grades required to operate and support the system over its planned lifetime in both peace and war. The needed manpower and personnel (the numbers, skills mix, and grade levels) are influenced by decisions made in other ILS element considerations. As a system evolves through the increments, continuing efforts to simplify man and machine interfaces and utilization of built-in test and fault isolation devices can reduce, at least at the organizational level of maintenance, the skill levels required of personnel who operate and maintain those systems. Accomplishing the logistics support mission in the most efficient and economical way should be a primary focus in determining manpower requirements for each increment.

Support Equipment (SE) is all the equipment required to support the operation and maintenance of weapon systems. To the extent possible, support equipment and the systems they support should be designed such that the planned, future system increments under Evolutionary Acquisition do not drive extensive changes to the equipment needed to keep said items applicable and operational. There is a compelling benefit to having common aerospace ground equipment, munitions equipment, test equipment, and so forth. Thus, support planners and single managers should look across systems for common SE opportunities. In cases where a system change is needed, the ideal scenario would include simultaneous upgrades to all fielded systems and related support and test equipment. This reality also tends to suggest an extensive use of support equipment with modularity and scalable capacity such that upgrades are easier to execute.

Technical Data includes recorded scientific or technical information. Providing access to technical data can often be expensive and is, therefore, often considered a ripe opportunity for cost savings in new programs. However, the high cost is driven by its high value, and this decision should not be taken casually. While it may seem expensive, if access to data is not acquired when the design becomes stable, the production of spares in the future may not be competitive, and organic repair may not be possible. If the government's right to access technical data is a stipulation in the award of the basic weapon system contract, many sustainment problems can be precluded. Therefore, access to the full range of technical data should, at the very least, be priced and made available for government consideration and purchase. The decisions for each increment should be a result of the support concept and not vice versa, and clearly, the data costs will be a key consideration in that decision.

Training and Training Support planning considers processes, procedures, curricula, techniques, training devices, simulators, and other equipment needed to train personnel to operate and maintain a weapon system. Training needs should be considered and integrated with any program's flow from the first increment through the last increment. As systems progress from one increment to the next, training needs must be identified, funded, and initiated a lead time away from implementation to avoid negative impacts on operational capability. Ideally, if all systems and associated equipment are retrofitted or replaced in concert with the introduction of the new increment, the training (both operator and logistics) should be completed prior to initial operating capability of the new increment.

Facilities as an ILS element ensure that planners define necessary facilities or facility improvements for new acquisitions and determine locations, space, utilities, environmental, real estate, and equipment needs. The facility requirements associated with fielding new systems or associated future increments warrant considerable analysis and planning. Fairly unique to this element are the type of funding and lead times associated with constructing new facilities or renovating existing facilities to support system beddown. Normally, military construction (MILCON) funding (3300 appropriation) is used for facility construction. These funds are planned and programmed for by the MAJCOM acquiring the new system, with support from

the system program office. MILCON funds are authorized and appropriated apart from acquisition program dollars. In addition, the calendar time it may take to get new facilities constructed can be years in the making. The lead time required to budget, design, and construct facilities, while system requirements may not yet have been fully defined, further complicates the rapid modification of this logistics support element from one EA increment to the next. Given these facts, minimizing the need for new facilities to support system beddown and the need for adequate lead time for MILCON budget requirements should be given additional weight in early program planning and design selection activities.

Computer Resources Support (CRS) encompasses the facilities, hardware, software, documentation, manpower, and personnel needed to operate and support mission-critical computer hardware and software systems. CRS is a critical enabler in most, if not all, military systems. Whether embedded in the fielded system and needing support or external to the weapon system (for example, part of the data management system or support equipment for supporting the fleet), computer resources can make or break the ability of the system to reach its operational potential. It is common knowledge that computer technologies often face a generational change every 18-24 months, so systems, especially those using an EA acquisition approach, must give significant consideration to planning for these changes. Whether systems are significantly upgraded or replaced entirely, the logistics support plan needs the flexibility and preparedness to deal with these coming changes. Design considerations in this area include, but are not limited to, such items as sufficient spare memory, reserved physical space, weight allowances, cooling capability, modularity, open systems architectures, and training and training support.

Other Important Support Considerations for Evolutionary Acquisition

The facility requirements associated with fielding new systems or associated future increments warrant considerable analysis and planning. There are other related considerations. Configuration management (CM), for instance, is not one of the ILS elements but is another crucial consideration, especially so under an EA scenario. It is one that touches several, if not all, ILS elements.

In the traditional approach, configuration management is already an important issue, and there can be multiple configurations of weapon systems in the field. Evolutionary management magnifies this version issue, making good configuration management even more important and requiring a more structured management approach. As the system progresses though the increments, the process by which the changes are planned, documented, executed, monitored, and communicated (that is, the CM process) is critical to the success of the overall program. If done properly, it will allow for orderly implementation of improvements to a weapon system over time. Therefore, some of the challenges with interoperability and multiple versions at a single location could be better managed and mitigated. Some unique provisions should be considered in the CM plan. Planners may or may not decide to retrofit previous versions, but they must consider and account for all support implications. The Configuration Control Board (CCB) probably should be stood up earlier in the acquisition process. System and functional reviews will happen earlier, so the CCB should be in place earlier to support them. There is likely much more activity in the CCB under Evolutionary Acquisition than in a single-step approach. The CCB's membership probably should be broader than under a single-step approach to address the orderly upgrade of the system through the increments. Consideration also should be given to making the CCB a relatively permanent, standing body. As such, it would provide more consistency throughout the program, from one increment to the next. With at least the core members of the CCB formed as a standing body, assumptions, analyses, and decisions previously made would need to be revisited less often, and a consistent plan would be more likely to be executable through to the final increment.

Corporate reviews remain an essential consideration: Evolutionary Acquisition does not eliminate them, even though many feel some of these reviews are burdensome and could slow down an EA process. Such reviews are necessary for many reasons:

- To comply with laws, policies, and strategies (for example, core, 50/50, depot-maintenance strategy, public-private partnerships).
- Because linkages between weapon systems are becoming greater. Many systems will be designed to work as systems of systems in the near future, so changing a system or its support structure could have significant impacts on other systems.
- To adequately assess the impact of each increment on the entire supply chain supporting the weapon system. Though the supply chain was capable of supporting a previous increment, it may not be capable of supporting future increments without additional planning. There is potential for different bottlenecks or gaps to surface in the supply chain with each new increment.
- To enhance leveraging in the purchase of goods and services involved with each increment. As one example, the strategic sourcing initiative has demonstrated, when government organizations and programs join forces to manage suppliers, there is potential for leveraging buying power to reduce delivery times, improve product performance, and decrease or stabilize prices.

Thus, system program offices, single managers, and logistics specialists cannot become individual stovepipes, fiefdoms, or silos under Evolutionary Acquisition and Reality-Based Acquisition. Corporate reviews help preclude this and look at the enterprise-wide picture. While corporate reviews may not be eliminated, they could always benefit from becoming more agile and streamlined under Evolutionary Acquisition.

One final consideration is also worthy of mention. In many respects, the performance-based logistics (PBL) initiative goes hand in hand with Evolutionary Acquisition. Performance-based logistics is already DoD's preferred approach for implementing product support. Under performance-based logistics, product support professionals negotiate logistics performance agreements with the operational customers and then build incentive-based performance agreements with commercial and organic providers, allowing them flexibility to build, accomplish, and improve support in a timely fashion. The goal of performance-based

logistics is to create a reliable support system that reduces the need for and cost of logistics. It also tries to develop a maintainable system that reduces the need for resources, such as manpower, equipment, and spares required to support operational performance. Performance-based logistics attempts to reduce not only the resource requirements for logistics but also the requirement for logistics itself.[8]

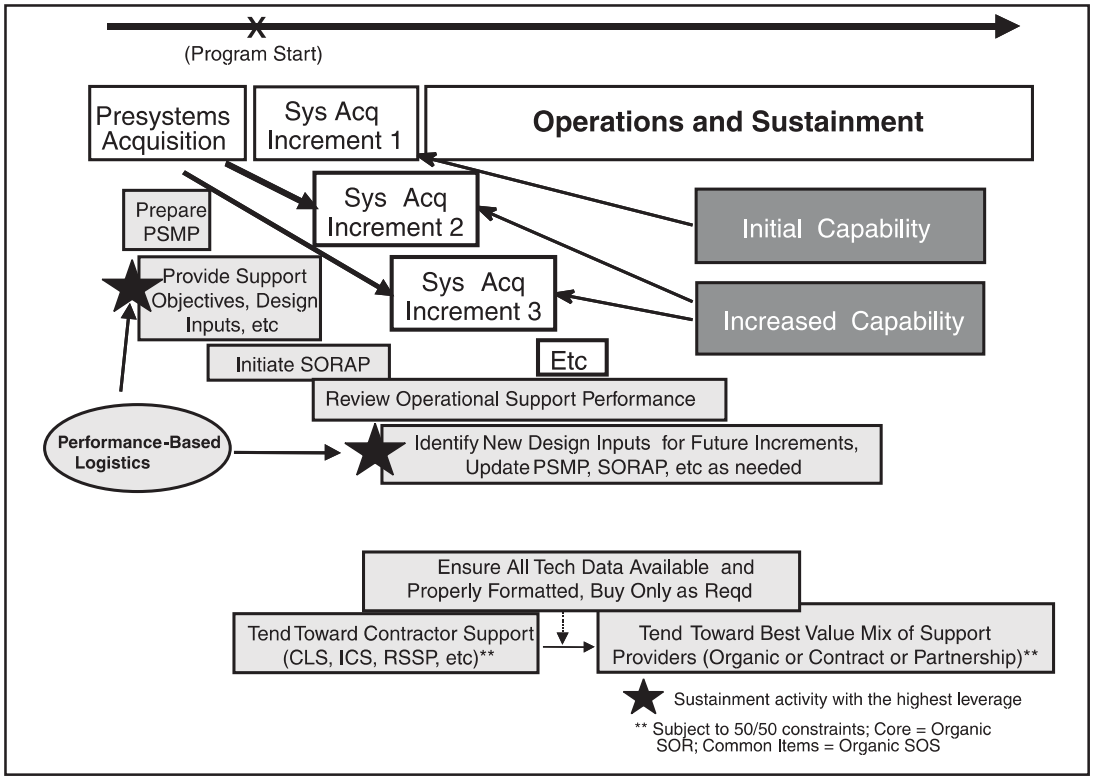

Figure 3. Summary—Sustainment for Evolutionary Acquisition

Conclusion

Evolutionary Acquisition is a strategy to provide the warfighter with improved, militarily useful capabilities delivered more rapidly. The strategy is an essential part of Dr Sambur's Reality-Based Acquisition policy that focuses on shortening acquisition time and increasing credibility to the warfighter. Though the acquisition environment has changed, the basic support framework probably has not changed much. With the faster fielding of successive increments, however, support complexity has certainly increased. Configuration management deserves increased attention, as Evolutionary Acquisition is likely to create multiple versions of the same system. At the same time, each increment must be fully supportable in an affordable manner. There should be no doubt that early logistics planning in an EA environment is more important than ever. Early development and continuous assessment of the Product Support Management Plan enhances this planning, as do corporate reviews. PBL strategies help give incentive to contractors to provide innovative logistics solutions, and the ILS elements continue to provide a useful framework to plan a robust range of support over a program's life cycle. Figure 3 overlays some of the key support activities on a generic program life cycle. Any member of the acquisition and sustainment communities would do well to understand these relationships and stay tuned to the evolving policies in this area over the coming years.

Notes

1. Marvin R. Sambur, Assistant Secretary of the Air Force (Acquisition), "Reality-Based Acquisition System Policy for all Programs" memorandum for MIDAs, FADs, PEAs, and DACEs, 4 Jun 02.
2. For the purposes of this article, product support, logistics, and sustainment are considered relatively synonymous. It can be defined as "the entire package of support functions necessary to maintain the readiness of and operational capability of weapon systems, subsystems, end items, and support systems" throughout the life cycle of a weapon system, Air Force Regulation 63-107, 29 May 01.
3. Lt Gen Michael Zettler remarks during panel discussions at the Acquisition and Logistics Excellence Week seminar at Wright-Patterson AFB, Ohio, 21 Oct 02.
4. Some concepts and products that could enhance faster support capability for new weapon systems include prognostics, increased reliability and maintainability, common support equipment, and open systems architecture.
5. Reference Air Force Instruction 63-107, section A2.4 for further information. At the time of this writing, there has been some debate on whether a PSMP should continue to be required by regulation under Reality-Based Acquisition. It is the opinion of the authors, however, whether required or not, a big picture, long-term support strategy is extremely beneficial for the sustainment of a weapon system, and the PSMP provides a good avenue for that.
6. At the time of this writing, there has been some debate on whether a PSMP should continue to be required by regulation under Reality-Based Acquisition. It is the opinion of the authors, however, whether required or not, a big picture, long-term support strategy is extremely beneficial for the sustainment of a weapon system, and the PSMP provides a good avenue for documenting those plans.
7. There are many parameters: reliability, maintainability, and deployability, sustainability, standardization and interoperability, fuel, utility, and energy management, testability, dependability, transportability, durability, availability, survivability, integrated diagnostics effectiveness, transportability, accessibility, spares support, mission effectiveness, serviceability, software reprogramability, level of repair, industrial support base, support equipment, inspections, human factors, corrosion, physical obsolescence, hazardous material management, software speed and efficiency, calibration, revised tactics, training, manpower, system safety, nondestructive inspection, changes in the environment, mobility. Design interface parameters are expressed in operational terms rather than as inherent values.
8. Further guidance on PBL can be found in the DoD publication *Product Support: A Program Manager's Guide to Buying Performance*, Oct 01.

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AIR FORCE JOURNAL of LOGISTICS

Volume XXVII,
Number 1
Spring 2003

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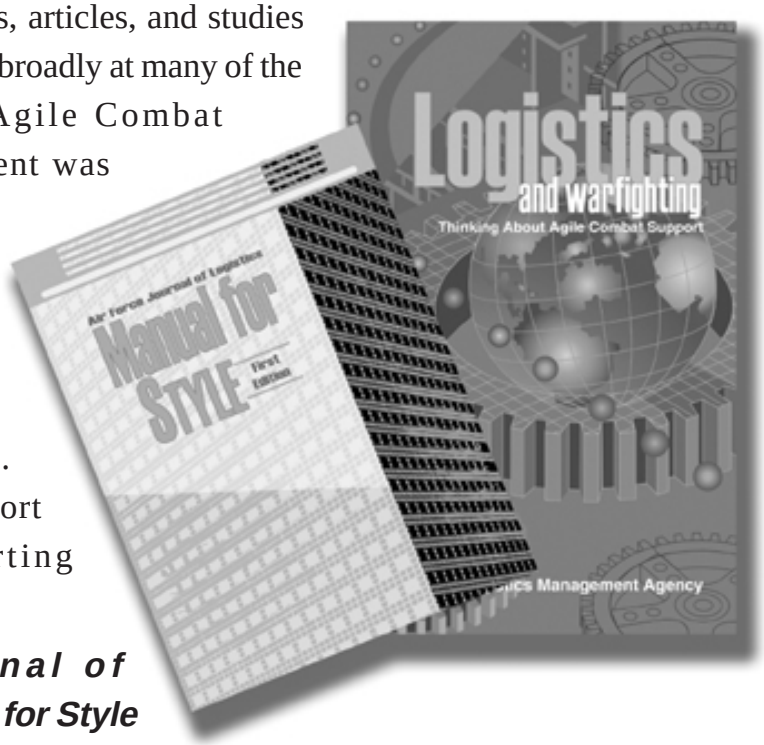

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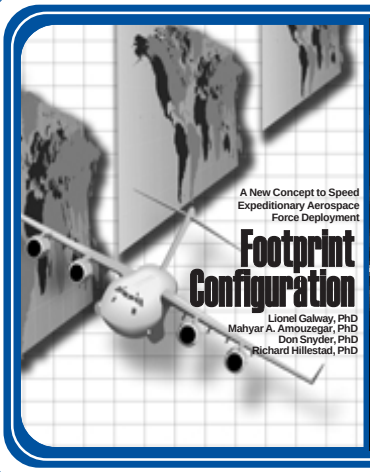

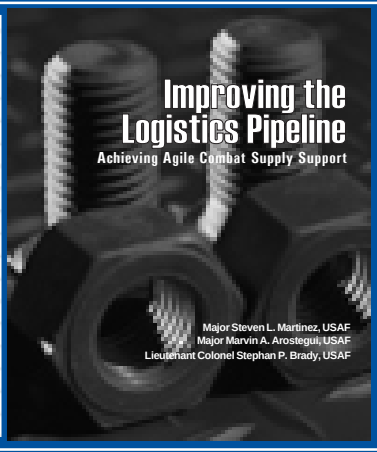

The Editorial Advisory Board selected "Footprint Configuration"—written by Lionel Galway, Mahyar A. Amouzegar, Don Snyder, and Richard Hillestad—along with "Improving the Logistics Pipeline"—written by Major Steven L. Martinez, Major Marvin A. Arostegui, and Lieutenant Colonel Stephan P. Brady—as the most significant articles to appear in the *Air Force Journal of Logistics*, Vol XXVI, No 4.