

Reducing Total Ownership Cost in DoD

Increasing Affordability of DoD Systems

JAY MANDELBAUM • SPIROS PALLAS

The total ownership cost problem has been well documented; as modernization is deferred, weapons systems age and costs for operations and support (O&S) increase. With relatively flat budgets, aggravated by excess infrastructure and inefficient overhead processes, more dollars for O&S means fewer dollars for modernization – leading to increasing costs and decreasing future readiness.

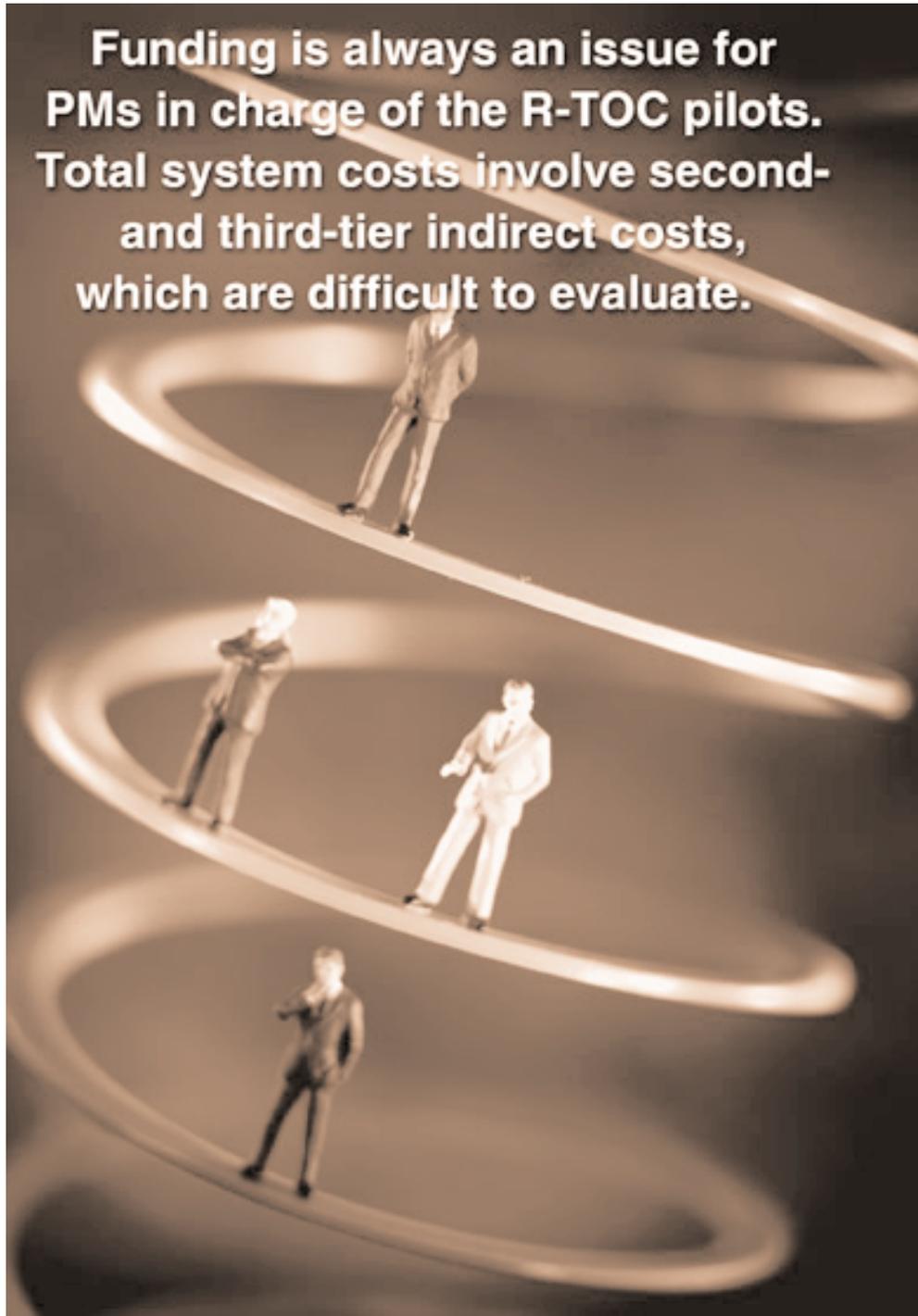
Conceptually, we have known how to attack this problem for some time:

- Continuous insertion of new technology to increase reliability, thereby decreasing the demand for support.
- Process change to improve the efficiency with which support is delivered, with the emphasis on competitively sourced product support.

The modernization process itself is also an important opportunity for the Reduction of Total Ownership Cost (R-TOC). The best time to reduce such costs is early in the acquisition process, either during initial acquisition or modification of the system. Conducting cost-performance trade-offs involving the user increases future readiness, not only through newer parts but also through designing less costly maintenance and operating requirements.

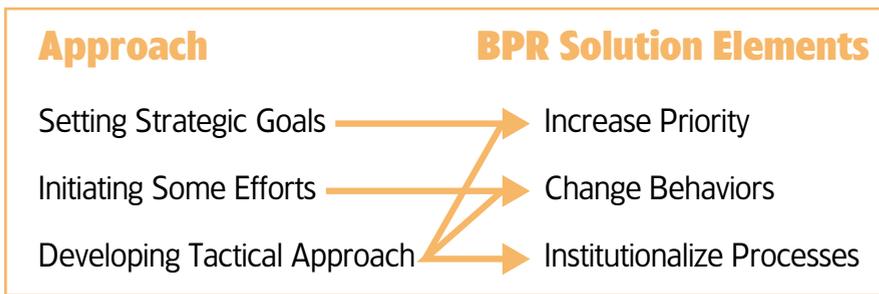
The Department of Defense (DoD) introduced these tenets several years ago as part of the “Cost As an Independent Variable” (CAIV) process. CAIV must become much more tightly integrated with the modification of legacy systems. A modification program can be a very effective opportunity for introducing

Funding is always an issue for PMs in charge of the R-TOC pilots. Total system costs involve second- and third-tier indirect costs, which are difficult to evaluate.



Mandelbaum is the Executive Secretary of the Defense Systems Affordability Council, Office of the Deputy Under Secretary of Defense for Acquisition Reform. Pallas is the Principal Deputy Director, Strategic and Tactical Systems, Office of the Under Secretary of Defense for Acquisition, Technology and Logistics.

FIGURE 1. Overall Approach



higher-reliability technology and components while increasing capability to meet military needs.

While these principles may be straightforward, implementation proved difficult – an imposing number of organizational barriers had to be overcome. The Department, therefore, approached this problem from a Business Process Reengineering (BPR) standpoint with the following key elements:

- **Increasing the visibility and priority of the problem.** Senior leadership made affordability a priority, not an afterthought or byproduct, with the Defense Systems Affordability Council (DSAC) and the R-TOC Pilot Programs as the key vehicles for senior leadership involvement.
- **Changing the behavior of organizations and individuals.** The behavior of people from all levels of the defense acquisition community changed. A continuous, purposeful search for, and implementation of R-TOC initiatives took place, including across organizational boundaries.
- **Institutionalizing R-TOC processes.** Finally, barriers were removed and R-TOC efforts became embedded in routine processes. Continuous process improvement resulted, enabled by ongoing initiatives, review of results, and course corrections, as appropriate.

The purpose of this article is threefold. It will demonstrate how specific problem-solving approaches taken by the Office of the Secretary of Defense (OSD) and the Services, within the context of the BPR elements, have resulted in changes to how DoD does business in today's acquisition environment, fol-

lowed by documentation of some of the initial aggregate results. Finally, it will identify some of the more difficult issues where more work remains.

The Approach

The Department's overall approach to the R-TOC problem combined three strategies: setting strategic goals and objectives; starting some efforts to build momentum early; and while efforts were underway, developing and implementing a more refined tactical plan. While this ordering makes sense logically, in reality its implementation contained a great deal of overlap. The overall approach supports the three BPR solution elements depicted in Figure 1.

Setting Strategic Goals, Objectives

To initiate the process of increasing visibility and priority of the R-TOC problem, the DSAC developed a strategic approach to affordability. In January 1999, DoD published *Into the 21st Century – A Strategy for Affordability*, which established three strategic goals for the acquisition, technology and logistics enterprise within DoD. The fiscal 2001-2005 *Defense Planning Guidance (DPG)* modified these goals somewhat by targeting a 20 percent reduction in O&S costs less fuel and military manpower in fiscal 2005 and omitting the intermediate-year targets. The fiscal 2002-2006 DPG excluded the fuel and military manpower exceptions. From a process perspective, however, the primary point is that the following three key goals are now in place to increase the visibility and priority of the issues.

- Field high-quality defense products quickly; support them responsively.
- Lower the total ownership cost of defense products.

- Reduce the overhead cost of the acquisition and logistics infrastructure.

R-TOC is a key strategy for achieving the latter two goals, with the following two associated objectives most influential in lowering total ownership cost and reducing overhead:

- For fielded systems, reduce the logistics support cost per weapon system per year compared to the fiscal 1997 baseline of \$82.5 billion by 7 percent by fiscal 2000; 10 percent by fiscal 2001; and a stretch target of 20 percent by fiscal 2005.
- Reduce the funding required by logistics and other infrastructure from the fiscal 1997 baseline of 64 percent of Total Obligation Authority (TOA) by 62 percent by fiscal 2000; 60 percent by fiscal 2001; and a stretch target of 53 percent by fiscal 2005.

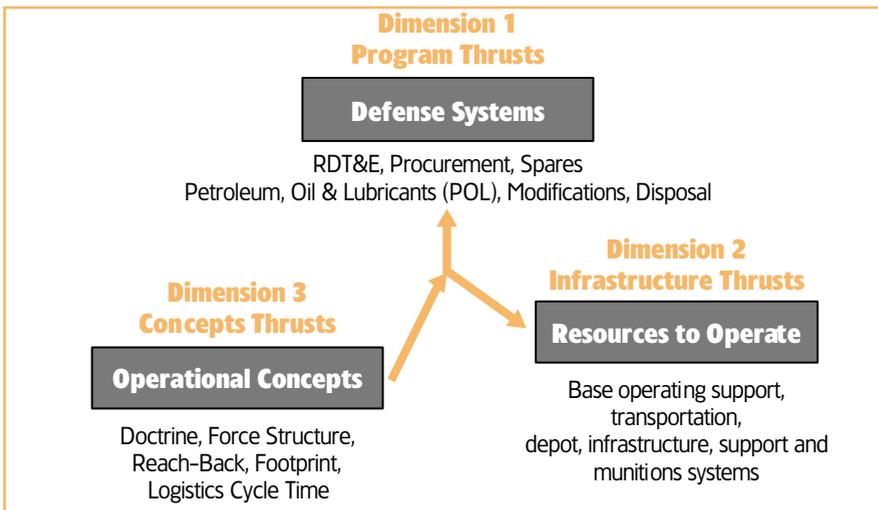
Building Momentum with Pilots

To begin the process of changing the behavior of organizations and individuals, the Services were directed in January 1998 to establish aggressive, time-phased TOC reduction goals for major programs. The DSAC decided in that same January 1998 meeting that the establishment of R-TOC goals should involve consideration of baseline costs and top cost drivers; incentives for government and industry; product and process reengineering; trade-off studies; special DSAC support (e.g., regulatory relief, waivers, funding flexibility, and authority); and other factors as they emerged.

Also during the meeting, the Service Acquisition Executives (SAEs) were asked to consider establishing TOC flagship or "pilot" programs. The pilot program concept, conceived as an instrument for innovative experimentation and change, emphasizes cross-feed and organizational learning.

Why a program rather than a functional orientation? Clearly, successful reduction of TOC would require cross-functional cooperation. Operating under that premise, who then would be in the best position to integrate across functions? Although the SAEs recognized from the

FIGURE 2. Dimensions of Air Force R-TOC Program



beginning that significant issues with funding and other visibility issues would likely surface no matter who took the lead, the PM had better horizontal visibility than anyone else. PMs have always cut across functions to do their jobs, and also have generally done so more on the basis of earned than formal authority.

At a December 1998 DSAC meeting, the SAEs consolidated the pilot program concept, where each Service agreed to provide 10 program names for the PM Oversight of Life Cycle Support 912c study, for pilot activities generated by the Product Support 912c study, and for the Section 816 study (10 of which would be reported to Congress). The DSAC would continue to track all 30 of the Service pilot programs as R-TOC programs.

The pilots were intentionally a mix of programs from all segments of the life cycle – developmental, in production, under modification, and fielded. Ground aviation, missile, sea, and space systems were all included. In this context, the pilot programs actually served two purposes: both are R-TOC pilots and logistics reinvention pilots, with the latter being a subset of the former. Successful R-TOC requires action from both a program and an infrastructure perspective, hence the early and pragmatic decision to “join R-TOC and logistics reinvention at the hip” – two distinct initiatives, each with a specific agenda, which complement each other to a high degree.

Developing, Implementing More Refined Tactical Plan

To develop and implement a more refined tactical plan, DoD designated the Directorate of Strategic and Tactical Systems as the R-TOC Focal Point in June 1998, charged with synchronizing and integrating ongoing R-TOC activities, championing the R-TOC cause, and overseeing the pilot programs using methods that had proved successful with the earlier CAIV flagship programs. The tactical approach taken by the directorate had components that flowed from the three key BPR elements of the overall DoD attack on R-TOC.

VISIBILITY AND PRIORITY

In the area of increased visibility and priority, the Department took two actions to direct resources to TOC reduction. First, the DPG released in April 1999 directed the Services to program \$200 million per year to boost O&S cost-reduction activities. In a May 1999 memorandum, Dr. Jacques Gansler, then USD (AT&L) [Under Secretary of Defense for Acquisition, Technology and Logistics], asked the Service Under Secretaries and the Vice Chiefs of Staff for their “... proactive support for the future readiness of our forces through sustained modernization.”

The memorandum also laid out a need for formal cost-reduction plans for the pilot programs based on trade-offs in three key areas: reduced demand from weapon systems via reliability and

maintainability improvements; reduced supply chain response times, leading to reduced spares, system support footprint, and depot needs; and competitive sourcing of product support, leading to streamlining and overhead reductions.

Also, OSD established an additional source of funds with Program Budget Decision (PBD) 721 in December 1999. PBD 721 identified \$56 million in funds for “... cost reduction efforts that show promise of performance improvements and high return on investment (ROI) but are lacking in the up-front investment money to initiate the projects.” This PBD was important on at least two counts.

- First, supporting initiatives such as interactive electronic technical manuals for which program funds are often difficult to find, will generate real savings that would otherwise probably not be realized. Within the *Future Years Defense Plan*, the overall PBD 721 ROI is projected to be greater than 6:1.
- Second, and possibly more important is the fact that the PBD demonstrated to the Services, especially to Service PMs, much more forcefully than any number of inspirational talks, that OSD senior leadership was committed to R-TOC.

CHANGING BEHAVIOR

Strong working relationships were shaped to change the behavior of key players in the process. An R-TOC Working Group was established under the leadership of the Focal Point where interested parties were encouraged to attend and participate in an open atmosphere. The Working Group discusses and informally coordinates all actions before passing them to senior leadership, including the DPG language, the May 1999 memorandum, and the R-TOC PBD previously discussed.

INSTITUTIONALIZATION

Ongoing joint forums and procedures for discussion and oversight were created to help institutionalize processes within the Services for implementing solutions. The most important of these

were quarterly Pilot Program Forums. The Forums are used to exchange information with and among the pilot programs on a “not for attribution” basis. Despite (or possibly because of) the informality, the Forums serve as an effective mechanism for policy changes. Service and Defense Acquisition Executives opened the early Forums, demonstrating senior leadership commitment. Written and oral summary (but not program-specific) reports of Forum results were provided to senior leadership. Issues raised, either in the Pilot Program Forums or in the R-TOC Working Group meetings, were rapidly brought to the DSAC for resolution and guidance.

Actions Taken by the Services

Each Service has implemented the R-TOC program in a way tailored to its own needs and institutional processes. As will be seen in the following brief overviews, the Service programs exhibit both common threads and specific innovations unique to each Service.

Navy Execution of R-TOC Program

To illustrate the seriousness of the Navy TOC problem, in fiscal 2001 alone Navy O&S costs increased \$3.4 billion, or 6.7 percent, for a theoretically stable force structure. Additionally, the Navy, expecting the problem to grow worse, forecasted that the average retirement age for ships would increase to the 30- to 37-year range. By comparison, the average age of ships retired by the Navy during fiscal 1999 was less than 22 years. Aircraft were forecast to display a similar trend. The Navy answer to these challenges – its well thought-out way of increasing visibility, getting something going, and starting the process of institutionalization – was the Navy Cost Reduction and Effectiveness Improvement (CREI) process.

The CREI process begins with the observation that nearly everyone has good ideas on how to reduce costs and improve effectiveness. Yet, too few formalized outlets for these ideas exist, and when they are formally proposed, responses have often been bureaucratic and obstructive. The Navy CREI process was formulated to ensure ideas that re-

Successful R-TOC requires action from both a program and an infrastructure perspective, hence the early and pragmatic decision to “join R-TOC and logistics reinvention at the hip” — two distinct initiatives, each with a specific agenda, which complement each other to a high degree.

duce costs, reduce workload, improve quality of life, and improve readiness are appropriately vetted, funded, and implemented. These ideas are then competed and balanced against other priorities during the Navy budgeting process.

The key to CREI success, as is the case with R-TOC generally, is leadership by those with direct knowledge of, and influence over our fiscal resources and associated challenges. Tri-Chairs of the CREI Council are senior executives from the Assistant Secretary of the Navy for Research, Development and Acquisition; the Deputy Chief of Naval Operations for Warfare Requirements, Assessments and Resources; and the Deputy Chief of Staff for Programs and Requirements. Included on the Council are the Department of the Navy Budget Officer; Deputy Chief of Naval Operations for Logistics, Atlantic and Pacific Fleet Maintenance Officers [N43s]; and various other representatives from Secretariat and Service Headquarters offices. Understandably, the role of the financial community in this process is indispensable.

The CREI process can perhaps be best illustrated by the Program Objective Memorandum (POM-02) experience, which ran from September 1999 through early May 2000. In response to an initiatives’ call, Navy units submitted 126 initiatives for funding consideration. The excellent response reflected three findings: a sense that it was the right thing to do, top management attention, and protection of savings.

The last finding deserves special discussion. A key disincentive to proposing similar initiatives in the past was the all-too-often-realized fear that higher-level management would appropriate any savings, both real and imaginary, leaving the proposing activity potentially worse off than before. CREI ground rules ensure that if a Resource Sponsor funds an initiative, the sponsor keeps the associated savings to reapply toward unfunded requirements. The sponsor, in turn, is encouraged to provide similar positive incentives to the other activities submitting proposals to encourage more aggressive participation.

To assist in selecting among initiatives, the Navy created a disciplined ranking process that took into account financial measures such as internal rate of return as well as risk and utility. Although the largely mechanical ranking process is intuitively defensible and involves the right players, experience has long shown that decisions on complex issues with potentially major consequences deserve something beyond a mechanical approach. While a ranking process is an important decision aid, some issues and implications come to light only after discussion (and sometimes debate) in a senior-level forum.

After careful consideration, 23 of the CREI proposals were presented to a senior-level CREI Council for review based on the dollar magnitude, policy implications, or other significant characteristics such as extraordinarily high returns. Final ranking reflected integration of senior-level priorities with those determined mechanically. The Navy views the results of the POM-02 experience as an unqualified success. New POM-02 CREI

investments totaled about \$1 billion across the fiscal 2002-2007 *Future Years Defense Plan*; these initiatives are expected to produce an average ROI of 5.3 to 1.

Army Execution of R-TOC Program

To provide visibility and priority, the Vice Chief of Staff of the Army and the Under Secretary of the Army chartered the Army TOC program. Within that charter, the Army TOC Directorate administers the Army's program. The TOC Directorate is the central Army TOC integration point and change agent, with the following primary responsibilities:

- Fosters TOC awareness across the Army.
- Identifies needed changes and improvements in TOC processes and procedures.
- Develops funding for TOC issues.
- Encourages the development and submission of TOC initiatives.
- Serves as the primary interface with the DSAC.

As is the case with both the Navy and the Air Force, the Army also suffers from a fleet that is getting older. Thus, a particular focus of the Army program is recapitalization of Army systems – the systems upgrades needed to bring the fleet to a zero time/zero mile condition. In addition to reducing O&S costs, recapitalization also extends service life; improves reliability, maintainability, safety, and efficiency; and enhances capability. Without question, recapitalization is an essential component of overall system life cycle management. In this regard, a basic concept behind both the Army TOC program and life cycle management is that these responsibilities are inherently shared by the PMs and the sustainment community. As mentioned earlier, although the PM naturally is better positioned to “see” across a specific program, sustainment functional managers have superior visibility within functions: *neither is in a position to go it alone*. The Army considers this fact of life to be one of the major lessons from Army pilot programs – long-term institutionalization of R-TOC depends on understanding it. And the importance of understanding

R-TOC directly translates to the DoD level, as will be evident in the next section on the Air Force program.

In terms of process, the Army TOC program has many of the same characteristics previously outlined in conjunction with the Navy program. The TOC Directorate assists in development of initiatives by providing the analysis tools and processes as well as assisting with funding methods. In a process corollary to the Navy CREI, the Army uses a cross-Army Working Integrated Product Team (WIPT) and Senior Steering Group (SSG) to review, prioritize, and support funding for initiatives.

The WIPT is comprised of GS-14/15 and O-5/6 members, while the SSG is comprised of members of the senior executive service and major generals. Army TOC initiatives can be submitted at any time; however, the TOC office, on behalf of the Vice Chief of Staff of the Army, conducts two semiannual data calls for TOC initiatives, which are timed to support the POM cycle.

In the most recent cycle, the data call resulted in 137 TOC proposals, eight of which the office subsequently presented for Vice Chief of Staff of the Army support. (As this article goes to press, another 20 are in the process of financial validation.)

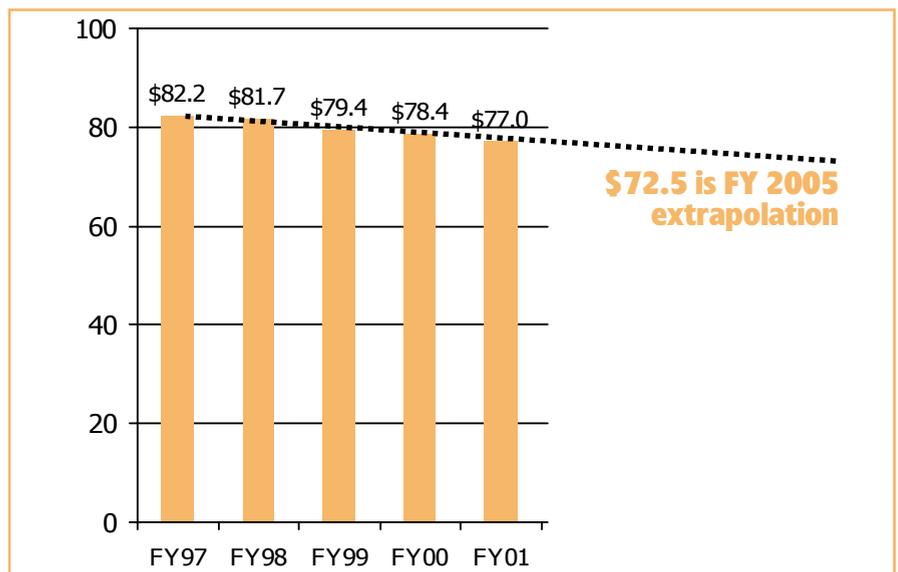
Air Force Execution of R-TOC Program

The objectives of the Air Force program were first to control costs, second to reduce costs, and third to use the results of the first two objectives to enable modernization reinvestment. Thus the Air Force, like its sister Services, saw the imperative of finding a way to transform the death spiral into a vital spiral. Figure 2 shows the elements of the Air Force R-TOC program, which encompasses three dimensions or thrusts: programs, infrastructure, and related concepts. Concepts ultimately determine the shape of programs and resources needed to operate them. The program thrust, naturally, is the responsibility of system program managers. The infrastructure thrust, in the view of the Air Force, is the responsibility of its wing commanders. Concepts, the most far-reaching thrust, involve choices and decisions that lie with the Secretary of the Air Force and the Air Force Chief of Staff.

The program thrust involves at least two important aspects: the development of the Air Force Total Ownership Cost (AFTOC) database as a means of increasing TOC visibility, and the role of pilot programs.

The purpose of AFTOC is to provide timely visibility into costs of major weapon systems – including their subsystems and components – across ap-

FIGURE 3. Total DoD Logistics Support Costs (FY97 \$B)



propriations and major commands, based on actual historicals (rather than estimates). Eventually, AFTOC will capture all Air Force TOC. AFTOC was designed to satisfy the needs of managers, at both headquarters and field level, for information such as cost-per-flying-hour, top cost drivers, and cost trends (e.g., due to aging aircraft). AFTOC implements a data warehouse concept by integrating data from 10 different Air Force databases, in contrast to the situation that existed prior to AFTOC, where individual managers had to consult a wide variety of databases and then integrate results themselves.

Air Force pilot programs have been the Air Force's way of getting something started. They encompass the B-1, KC-135, F-16, Space-Based InfraRed Systems, F-117, Airborne Warning and Control System, Cheyenne Mountain, Joint Surveillance Tracking and Attack Radar System, C-17, and C-5. In this case, as is true generally for DOD R-TOC, the pilot programs include a mix of systems in different environments and stages of the life cycle. The Air Force established reduction goals for each of these pilots, put implementation plans in place, and is now able to measure preliminary results. Specifically, 48 initiatives from within the pilot programs are currently forecast to generate over a third of a billion dollars in savings.

The Air Force also recognized the need for an incentives program to redress the historical concern about higher-level management appropriating savings, potentially leaving the organization that generated the savings worse off than before. The Air Force response was the Cost Savings Modernization Initiative (CSMI) process, which in effect is the starting point for the institutionalization process. Similar in concept to the Navy CREI, savings generated by a major command (MAJCOM) are available for reinvestment by the MAJCOM that generated them. If the CSMI is forwarded to the Vice Chief of Staff for Air Council approval, then the savings would be available for reinvestment anywhere in the Air Force. The bottom line of this process,

Although the PM naturally is better positioned to “see” across a specific program, sustainment functional managers have superior visibility within functions: neither is in a position to go it alone. The Army considers this fact of life to be one of the major lessons from Army pilot programs — long-term institutionalization of R-TOC depends on understanding it.

as was the case for the Navy, is that savings are available for reinvestment *by the organizational level that generated them.*

Results Are Not Instantaneous

One of the realities of TOC reduction is that results are not instantaneous. It takes time to identify promising initiatives, to put them in place, and then more time to see evidence that ownership cost is decreasing. The Department's R-TOC program has been formally in place since January 1999, when *Into the 21st Century – A Strategy for Affordability* was published. Already, leading indicators confirm that R-TOC is working, but also reflect evidence of future challenges.

First Indicator — Logistics Costs

The first indicator is the behavior of logistics costs. As noted earlier when

discussing the Department's approach, one of the more important objectives of the strategy was to reduce logistics costs by 7 percent in fiscal 2000; 10 percent in fiscal 2001; and, as a stretch target, 20 percent by fiscal 2005. Figure 3 shows the current projections as taken from the fiscal 2002-2007 POM. Clearly, the trend is in the right direction, but the fiscal 2005 stretch target remains a challenge. The fact that fiscal 2005 procurement is projected at \$68.4 billion will also help — increased modernization will reduce O&S costs even further.

Second Indicator — TOA Costs

A second indicator is the behavior of total DoD logistics and other infrastructure costs as a percentage of TOA. Trends here are also very favorable. The Department will surpass its goals in fiscal 2000 and fiscal 2001, and based on POM 2002-2007 data (Figure 4), is projected to achieve its fiscal 2005 goal.

Third Indicator — Overall Numbers Tell the Story

Finally, looking at the evidence from the pilot programs themselves is instructive. Of the 30 pilot programs, 13 have now reported that they would achieve or exceed the 20 percent stretch goal with increased readiness. A year ago, only six programs projected that they would reach the target. Average savings are about 18 percent as compared to 10 percent one year ago.

The Future

To enable further significant improvement, several fundamental issues — each associated with building better relationships with customers and stakeholders — must be addressed explicitly.

Competitive Sourcing and the Congressional Stakeholder

One of the important enablers of R-TOC, as noted at the beginning of this article, is the Department's strategy of reengineering logistics through competitive sourcing of product support. The expectation, for which abundant empirical support exists, is that competitive sourcing will result in a more efficient infrastructure, will further reduce sup-

port and infrastructure costs, and will enable transfer of those savings into modernization accounts.

Since competitive sourcing will affect the choice between public and private providers with regard to the Congressional stakeholder, a dialogue is needed on logistics support generally and depot maintenance specifically, to provide for an agreed-to means of selecting the best providers. Neither the public nor the private provider is, per se, inherently the more effective and efficient provider. Efficiency is inherently higher where competition or some similarly powerful incentive exists. Further, the situation today is viewed in bipolar (private or public) terms, where the choices are actually becoming richer, especially with the advent of public-private partnerships or partnership-like arrangements.

Better Interfaces with Industry

Better interfaces are also needed with industry stakeholders. In a February 2000 letter to the Principal Deputy Under Secretary of Defense for Acquisition, Technology and Logistics, the Aerospace Industries Association noted “industry’s inability to get a DoD decision on proposed logistics innovations ... [and the lack of an effective] ... mechanism within DoD for evaluating and implementing attractive, innovative contractor proposed solutions.”

DoD has always recognized the need to look to industry for weapon system technologies. It is increasingly clear, however, that DoD should look to industry for advances in business processes as well. As is evidenced by the continuing increase in U.S. industrial productivity, “best commercial practices” is more than a slogan – it summarizes a set of new, often information technology-enabled process improvements that are of considerable potential value to the Department in reducing TOC.

Needs of PM Stakeholder

PMs for the R-TOC pilots are another set of crucial stakeholders. They often find it difficult to obtain the funding necessary to develop and validate solutions to R-TOC problems. Even when solu-

tions are known, funding is always an issue – a great deal of “lobbying” time is needed, and the outcome is uncertain. This is particularly true when, as is often the case, the initiative will directly or indirectly affect the business base or structure of an organization that is in the approval chain. PBD 721 is an important step in the right direction, but R-TOC problems will undoubtedly require an enduring, probably more robust solution.

Warfighter Customer’s Role

DoD’s R-TOC efforts have not always leveraged the Department’s greatest asset – the warfighter customer. DoD needs to find a way to provide the warfighter customer a more active role. One of the original tenets of R-TOC was establishing formal performance agreements with the warfighter. Thus far, few examples of this are currently in practice. Key to implementing needed changes in this arena is probably developing effective ways to blend capability increases with R-TOC via modernization programs.

Simplifying Funding Flows

Another lesson – and a problem yet to be resolved – is the need to simplify funding flows. The complexity of funding flows, in terms of both the number and “layers” of organizations involved both inside and outside the Services, is

a significant impediment to TOC reduction effectiveness. Additionally, obtaining realistic estimates of the total system costs (present, past, and future) is a daunting challenge. Total system costs involve second- and third-tier indirect costs, which are difficult to evaluate because of the lack of recordkeeping and the lack of adequate algorithms to determine such costs.

Pointing in the Right Direction

Remarkably, even at this early stage of the R-TOC initiative, the Department has achieved overwhelmingly positive results. Critics will be quick to point out projected savings (cost avoidances) are not the same as realized savings. However, cost avoidances equate to savings in future budget years. Meanwhile, to see these early, leading indicators consistently pointing in the right direction is indeed heartening.

Pilot programs have shown the way forward – all programs should eventually show similar savings. Work, however, remains to be done to fully capture the long-term savings yet to be realized from this vital initiative.

Editor’s Note: The authors welcome questions or comments on this article. Contact Mandelbaum at Jay.Mandelbaum@osd.mil; contact Pallas at spiros.pallas@osd.mil.

FIGURE 4. Total DoD Logistics and Other Infrastructure Costs As a Percentage of TOA

