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Applications of Should Cost to Achieve Cost Reductions

 **D. Mark Husband**

The initial version of the DoD's Better Buying Power (BBP) guidance directed use of "Should Cost Management" as a tool to increase efficiency and productivity in DoD acquisition programs. Over three years later, it is worthwhile to examine how programs have implemented Should Cost, the types of savings programs have identified and realized, and best practices and lessons learned that may be adopted or adapted by other programs. This paper provides selected Should Cost implementation examples from fifteen Major Defense Acquisition Programs (MDAPs) that have resulted in realized Should-Cost savings or initiatives that have an excellent chance of being realized. These programs employed various approaches based on the program's characteristics and phase within the acquisition life cycle.

Should Cost Policy

In his original Better Buying Power (BBP) memorandum, Dr. Ashton Carter, then-Under Secretary of Defense for Acquisition, Technology and Logistics (USD[AT&L]), directed managers of each major program to implement Should Cost management to drive productivity improvements in their programs (Carter, 2010a). In his subsequent BBP Implementation memo, program managers (PM) of all Acquisition Category (ACAT) I, II, and III programs were directed to establish Should Cost estimates for programs as they are considered for Milestone (MS) decisions, and to track success of such initiatives in their programs (Carter, 2010b).

...all of the BBP Initiatives are aimed at providing more capability without expending more dollars by improving productivity and eliminating excessive costs and unproductive overhead that have crept into DoD business practices over many years.

The purpose of Should Cost is simple and rational—its aim is to “identify and eliminate process inefficiencies and embrace cost-reduction opportunities” (Carter & Mueller, 2011). Beyond this commonsense purpose, several factors motivated the introduction of Should Cost. A primary motivation, as stated in Carter’s (2010a) memorandum, is that spending to the Independent Cost Estimate (ICE) can become a “self-fulfilling prophecy” (i.e., “the forecast budget is expected, even required, to be fully obligated and expended”). Congressional interest was also a compelling motivator; Congress addressed the subject (without using the term Should Cost) in the 2011 National Defense Authorization Act through the following language:

(a) cost estimates developed for baseline descriptions and other program purposes...are not to be used for the purpose of contract negotiations or the obligation of funds; (b) cost analyses and targets developed for the purpose of contract negotiations and the obligation of funds are based on the government’s reasonable expectation of successful contract performance in accordance with the contractor’s proposal and previous experience. (p.127)

Another motivation for Should Cost was the viewpoint that DoD's large budget increases after 9/11 and its focus on warfighter needs while waging two wars created inefficiencies that are unacceptable in today's fiscally constrained environment. Indeed, all of the BBP Initiatives are aimed at providing more capability without expending more dollars by improving productivity and eliminating excessive costs and unproductive overhead that have crept into DoD business practices over many years.

The following generalizations are based on the author's interactions with students while teaching Cost Analysis and Should Cost to hundreds of PMs and deputy PMs who attended the Advanced Program Manager's Course and Executive Program Manager's Course at the Defense Acquisition University (DAU) from 2010 to 2013. While the purpose and motivation for Should Cost have generally been well understood by the workforce, uncertainty and concern initially arose over how the concept would be implemented and executed. One source of confusion was the name. A "Should Cost Review" is an established term in Part 15 of the Federal Acquisition Regulation (FAR) § 15.407-4 that refers primarily to an extensive review of a contractor's operations to identify and promote more economical and efficient methods, and inform the government's negotiating position (General Services Administration, DoD, & National Aeronautics & Space Administration, 2005). "Should Cost," as directed by BBP, was intended to be simpler and more comprehensive; its objective is to seek efficiencies and productivity improvements throughout the acquisition Life Cycle by examining all cost elements, including government costs, acquisition strategies, and any techniques that could provide net savings. Another source of confusion during initial implementation was the difference between two of the concepts introduced by the BBP memorandum: "Affordability as a Requirement" *versus* "Should Cost." Consequently, the USD(AT&L) released a memorandum (Carter, 2011a) that explained the distinction between and compatibility of the two concepts: *Affordability* directs that quantified goals be established for unit and sustainment costs for DoD products (typically defined prior to MS B), driven by what the department can afford to pay, while *Should Cost* is a continuous effort to lower costs wherever and whenever it makes sense to do so. Thus, *Affordability* sets maximum costs based on budgetary considerations while *Should Cost* seeks the most economical acquisition of the procured item. *Affordability* drives prioritization and trades between requirements while *Should Cost* seeks the lowest possible prices once the Department decides what to acquire.

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Another concern about Should Cost implementation, which the author often heard expressed by PMs charged with executing the policy, is the potential to harm programs by making premature or unwise budget cuts based on projected Should Cost savings that have not been and may never be realized. This concern was foreseen during the formulation of the BBP Initiatives because the guidance memoranda all stress that Acquisition Program Baselines (APB) and budget positions shall continue to be based on Will Cost estimates. The policy for Should Cost savings established by the USD(AT&L) and Under Secretary of Defense (Comptroller) (Carter & Hale, 2011), specifies that Service Acquisition Executives (SAE) will declare when savings have been achieved, Service Comptrollers will validate that those savings have been realized, and such savings will generally be retained by the Service. Nevertheless, some program managers feared that Should Cost was another way to cut budgets, or that even if the DoD attempted to implement the concept smartly, Congress would cut program budgets based on Should Cost



estimates. As a consequence, program leaders were initially circumspect about publicizing their approaches and associated savings. As Should Cost implementation has matured, those fears have lessened and details of successful approaches are being more widely shared for several reasons. First and foremost, many PMs have found, sometimes to their own surprise, that significant amounts of money can be saved through Should Cost initiatives. Secondly, concern that such initiatives will be the impetus for budget cuts has waned, because in today's fiscal environment prudent acquisition managers are planning for inevitable budget cuts. Aggressively pursuing Should Cost initiatives enables the PM to get ahead of the power curve. Another reason approaches are being more openly shared is that Office of the Secretary of Defense (OSD) leadership has emphasized that the first priority and a primary purpose of Should Cost is to ensure that programs spend less than the Will Cost estimate and execute below their budget. Leaders recognize that, especially in the Engineering, Manufacturing and Development (EMD) phase, issues may arise that require additional funding; having a robust Should Cost program enables PMs to deal with unknowns and unfunded needs without asking for a budget increase. Should Cost savings thus make it more likely to execute a challenging program within budget. Finally, OSD leaders have consistently emphasized they don't expect every initiative to be successful; they want PMs to aggressively pursue multiple approaches, recognizing that some initiatives may not bear fruit.

Finding Should Cost Savings

How should a PM and team identify cost-reduction opportunities and create a Should Cost estimate? Carter and Mueller's (2011)¹ article and the "Implementation of Will-Cost and Should-Cost Management" memorandum (Carter, 2011b) provide some general approaches on where to look for savings² and three methods for creating a Should Cost estimate.³ These can be summarized:

- Look at the entire program, considering all costs.
- Look at examples from other programs, adopt best practices, and benchmark other programs.
- Look at the entire supply chain, considering not only prime contractors but also subtiers.

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- Look for program synergies, interdependencies, and opportunities to combine efforts with other programs. Carter's (2011b) guidance mentions integrating Developmental Testing/Operational Testing (DT/OT), but PMs should look for synergies and efficiencies anywhere possible.
 - Look for opportunities during the program's risk assessment process. Carter's (2011b) guidance mentions identifying alternative technologies and materials, but any opportunities for savings should be explored. Unlike industry, which is driven by profits, government PMs often focus solely on risks and pay insufficient attention to cost-reduction opportunities.

How well have programs done applying Should Cost principles, identifying cost-reduction initiatives, and managing and executing to targets? A variety of approaches that have been successfully employed by DoD programs are described below. These examples were collected from Major Defense Acquisition Programs (MDAP), most of which presented their approaches to the USD(AT&L) in a Defense Acquisition Board or Defense Acquisition Executive Summary review. Besides being vetted by OSD leadership, the author discussed these examples with program office leaders (the PM or deputy), who concurred that the approaches and savings accurately reflect their program's results. While these approaches were derived from MDAPs, in most cases they are applicable to ACAT II–IV programs and could also apply to Major Automated Information Systems, Defense Business Systems, and services contracts. Including only MDAPs in the dataset was not intended to exclude other programs, but arose naturally because information on those programs is more readily accessible through the media and regular reviews by the USD(AT&L). Further studies on successful Should Cost approaches specific to information technology and services acquisitions are warranted.

Should Cost Implementation Examples

This article's objective is to share successful Should Cost applications with the acquisition community. This requires defining what constitutes a "successful" Should Cost example. As described above, every DoD ACAT I–III program has been mandated to produce Should Cost estimates and initiatives. To distinguish between initiatives that have successfully achieved cost savings from those in their infancy or not yet initiated, the author created the following definitions for "*realized savings*" and "*projected savings*":

Realized savings: Reductions in actual costs (outlays), signed contract value, or President's Budget position resulting from specific Should Cost initiatives, compared to a documented Will Cost estimate or approved APB or Program Objective Memorandum (POM).

Projected savings: Documented estimate of savings for plans or proposals that have not yet been initiated, or projected life-cycle cost savings for efforts that have been initiated.

Although from a cost estimating perspective, a reduction in future budgets does not correspond to actual cost savings (particularly when work is not yet complete), the author believes these definitions provide a practical way to identify initiatives that have been approved by acquisition leaders and have yielded tangible results compared to those that may yield results in the future.

The Table provides a list of successful Should Cost approaches collected from 15 MDAPs during this study, which was conducted over 18 months beginning in October 2011. It illustrates approaches that have been adopted by multiple programs and the applicable acquisition phase for each approach. Space limitations preclude describing all these approaches in this article—additional briefing slides and a video presentation are available at DAU's Acquisition Community Connection Web site.⁴

TABLE 1. SHOULD COST APPROACHES WITH CORRESPONDING MDAPS, ACQUISITION PHASE, AND REALIZED AND PROJECTED SAVINGS

Should Cost Approach	Program	Acquisition Phase	Realized Savings*/FY	Projected Savings*/FY
Balancing affordability versus capability in design	OHIO	TDP		~\$1B per sub
	IAMD	EMD	\$53M/FY13-15	~\$240M PROC ~\$122M O&C
Applying Continuous Process Improvement Tools	A/M-9X	Production	\$21M. Lot 11/FY11	\$82M/FY11-15
	F-18	Production	\$27M/FY11	
	Apache	EMD	\$35M/FY11-12	N/A
Test program efficiencies	GMLRS	EMD	\$33.6M/FY12-13	
	Stryker	Production	~\$7.7M/FY12	
	Apache	EMD	NSP	
Reducing Schedule	GMLRS	EMD	NSP	
	A/M-9X	Production	NSP	
	VIRGINIA	Production	~\$2.4B/FY05-12	
Competitive Source Selection that placed premium on price	KC-46	EMD & Production	\$2.4B/FY11-16	\$428M by FY17

Should Cost Approach	Program	Acquisition Phase	Realized Savings*/FY	Projected Savings*/FY
Should Cost Analysis to inform negotiations prior to contract award	<i>F-22</i>	Production	\$32M/FY11	
	<i>EELV</i>	Production	NSP	
	<i>DDG-51</i>	Production	NSP	
	<i>GMLRS</i>	Production	NSP	
Tandem/Block/Bundle buys	<i>E-2D</i>	Production	\$73M, LRIP3 & 4/FY11-12	
	<i>GMLRS</i>	Production	\$52.3M/FY12-13	
	<i>Stryker</i>	Production	\$18M/FY11-12	
	<i>C-130J</i>	Production	\$610.6M/FY14-18	
Multiyear Procurement#	<i>CH-47F</i>	Production	\$373M/FY13-17	
	<i>DDG-51</i>	Production	\$319M/FY13-17	
	<i>E-2D</i>	Production	\$522.8M/FY14-18	
	<i>F-18</i>	Production	\$590M/FY10-13	
	<i>UH/MH-60</i>	Production	\$1051M/FY12-16	
	<i>V-22</i>	Production	\$852M/FY13-17	
	<i>VIRGINIA</i>	Production	\$1.04M/FY14-18	



Should Cost Approach	Program	Acquisition Phase	Realized Savings*/FY	Projected Savings*/FY
Accelerating or more efficiently aligning production	<i>AIM-9X</i>	Production	NSP	
	<i>EELV</i>	Production		~\$1.1B/FY14-18
	<i>F-18</i>	Production	NSP	
Downselect changed to dual award based on price	<i>LCD</i>	Production	\$2.9B/FY10-15	
Sharing benefits of favorable financing	<i>E-2D</i>	Production	~\$1.5%/FY11-12	
Maximizing competition through Profit-Related-to-Offer strategy	<i>DDG-51</i>	Production	~\$300M/FY11-12	
Leveraging FMS for Economic Order Quantity buys	<i>AIM-9X</i>	Production	NSP	
Performance Based Logistics	<i>Apache</i>	O&S	\$276M/FY11-15	
	<i>V-22</i>	O&S	All O&S initiatives: 18% reduction cost/flying hr	
Increasing operational cycle; reducing depot time	<i>VIRGINIA</i>	O&S		~\$1.4B/BY10
Repairing parts that were previously consumable	<i>V-22</i>	O&S	NSP	
Incorporating automation to lower future manpower costs	<i>LCS</i>	O&S	NSP	

*All savings in Then Year \$ unless otherwise noted
#Based on CAPE estimate; Service estimated savings are generally greater
NSP: not separately priced

Continuous Process Improvement Techniques

A proven methodology to identify and implement cost-reduction opportunities employs Continuous Process Improvement (CPI) techniques such as Fishbone Diagrams, Pareto (or histogram) Analysis, Plan of Action and Milestones (POA&M), and other tools as described in the “DAU Program Manager’s Toolkit” (Parker, 2011). Three MDAPs examined in this study used CPI techniques to identify Should Cost initiatives: AIM-9X, F/A-18 E/F, and Integrated Air and Missile Defense (IAMD). Each of these employed a four-step process:

- **Step 1:** Identify the biggest cost drivers and most promising cost-saving opportunities.
- **Step 2:** Analyze and prioritize opportunities based on objective criteria.
- **Step 3:** Create plans of action and milestones for each opportunity selected.
- **Step 4:** Monitor and measure implementation progress and resultant savings.

Figure 1 depicts one of many Fishbone Diagrams created by the IAMD Program Management Office (PMO) in its effort to identify cost drivers and savings opportunities. The chart is only a small portion of IAMD’s Step 1 efforts; for many of the opportunities shown in Figure 1, the IAMD PMO created additional, lower level fishbones that provided more detail about that opportunity, such as specific implementation actions and interdependencies with other efforts. When identifying opportunities, one should employ a multidisciplinary team, including industry participants if possible, to ensure a wide range of ideas are considered that take into account the entire system life cycle.

FIGURE 1. FISHBONE DIAGRAM EXAMPLE FROM IAMD SHOULD COST ESTIMATE

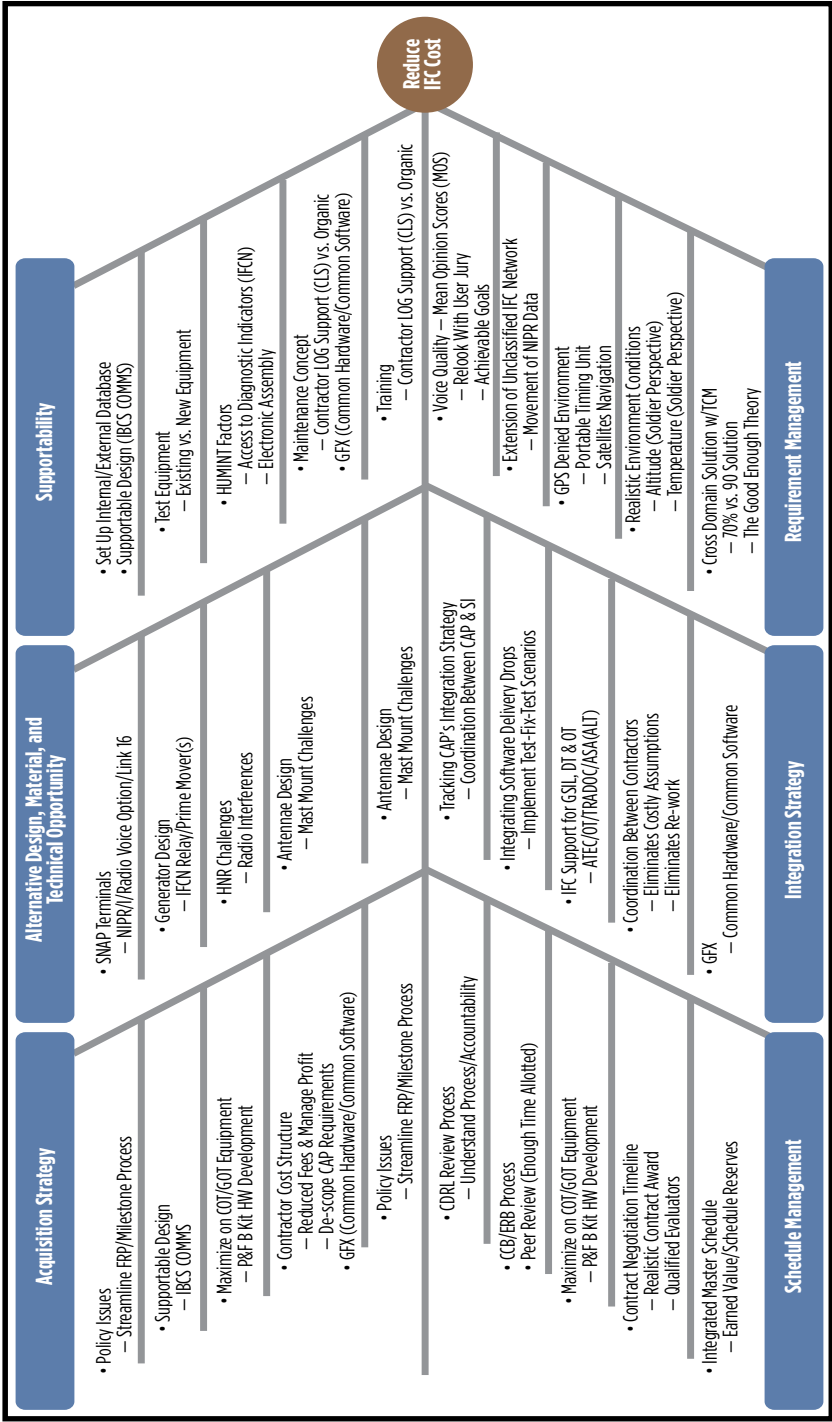


Figure 2 depicts a summary Pareto Analysis created by the AIM-9X PMO, which was the final result of their Step 2 efforts to analyze and prioritize opportunities. Again, this chart is only a small portion of those efforts. The team created multiple histograms that rank-ordered opportunities based on investment cost, ease-of-implementation, and implementation time. They also created weighting criteria, which allowed them to determine a quantitatively based overall ranking, as shown in Figure 2. A more detailed description of the complete methodology applied by the AIM-9X program was provided previously (Husband & Mueller, 2012).

Figure 3 depicts a POA&M chart created by the F/A-18 E/F PMO for one of their Should Cost initiatives; it shows by year the activities associated with the initiative and expected investment costs and projected savings. Creating such a plan is essential because it provides a tracking mechanism for determining when projected savings from initiatives are realized and thus available for other purposes. Developing metrics and trigger points to track each initiative is a best practice, because it increases the chances of realizing savings and provides the PM better situational awareness of the program's execution status and emerging issues.

Step 4 of the CPI methodology, tracking results as the initiatives progress, is arguably the most important step in realizing savings. Without a tracking mechanism and a means to evaluate results, the efforts to create and develop plans for Should Cost initiatives are likely to be wasted. Because Should Cost's primary goal is to increase efficiency and ultimately reduce costs, it is imperative that savings are tracked and reported.

Test Program Efficiencies

Implementing test efficiencies was an approach employed by four MDAPs in this study: AH-64E Apache, Guided Multiple Launch Rocket System (GMLRS), IAMD, and Stryker. These programs found efficiencies through combined test events and better utilization of existing data. For instance, AH-64E's savings resulted from leveraging selected DT/OT events and utilizing combined contractor/government testing on events that were planned to be conducted independently. When asked whether streamlining the testing program increased program risk, Apache's PM said the Apache team consciously considered that

possibility and therefore vigilantly ensured that all tests required in the Test & Evaluation Master Plan were conducted. AH-64E also realized savings by using Modeling and Simulation (M&S) in lieu of live-fire testing of an aircraft.

The GMLRS program partnered with the Army Test and Evaluation Command to identify efficiency opportunities. Their approaches included eliminating redundant testing by identifying commonality in components, leveraging previous test data and M&S efforts, and conducting a risk-informed reduction in the number of flight test assets employed. The IAMD program partnered with a sister program office to plan a single flight test that met requirements for both programs. IAMD also resized their test program, based on an analysis of tests being conducted in several interrelated programs. Likewise, the Stryker program utilized existing data from contractor tests to satisfy government requirements and conducted combined testing of several subcomponents that previously would have undergone separate, planned test events.

Multiyear Procurement and Tandem/Block/Bundle Buys

As shown in the Table, a number of MDAPs have realized significant savings through Multiyear Procurement (MYP) contracts, which allow use of a single contract to execute two to five years' worth of procurement. MYP requires congressional approval based on meeting several criteria in the governing statute, 10 U.S.C. § 2306b (Multiyear Contracts, 2011). (See O'Rourke & Schwartz, 2013, for discussion of MYP and Block Buy contracting.) Because some DoD and Service policy states that initiatives outside the PMO's control should generally not be considered as Should Cost initiatives, some uncertainty existed as to whether MYP-related savings should be included in a PM's Should Cost estimate. In practice, however, the use of MYP to lower costs has been included by several MDAPs as Should Cost initiatives in presentations to the USD(AT&L), and been well received. In general, the USD(AT&L) has been interested in any and all initiatives that improve efficiency and save money, including those that require congressional or Milestone Decision Authority approval. The UH/MH-60 PMO's success applying Should Cost principles to MYP negotiations was recently described by Vandroff and Kimble (2013).

FIGURE 3. PLAN OF ACTION AND MILESTONES EXAMPLE FROM F/A 18 E/F SHOULD COST ESTIMATE

	Prior		FY12		FY13		FY14		FY15		FY16		FY17		To Complete		Total Savings	Saving %
	Invest \$K	Return \$K	Invest \$K	Return \$K	Invest \$K	Return \$K	Invest \$K	Return \$K	Invest \$K	Return \$K	Invest \$K	Return \$K	Invest \$K	Return \$K	Invest \$K	Return \$K		
IRST EMD																		
EOD Phase I																		
Executed IRST EMD Contract (Roll-up)		\$2,000		\$12,500		\$14,250		\$6,750		\$2,500							\$58,000	22.0%
Fuel Tank Composition										\$500							\$300	
Reduce OEM Support (Flight Test)										\$50							\$50	
Savings Realized		\$2,000		\$12,500		\$14,250		\$6,750		\$2,850		\$0		\$0			\$58,350	
EOD Phase II																		
Schedule Acceleration (cScope/POP)																		
Potential Savings Realized		\$0		\$0		\$0		\$0		\$0		\$1,050		\$1,000			\$2,050	
Flight Test & Gov. Labor																		
Performance Flight Optimization												\$1,050		\$1,000			\$2,050	
Live Fire Shot Reduction								\$3,700		\$2,200							\$5,900	
Negotiated Gov. Labor Requirements										\$1,750							\$1,750	
MS111 Test Synergies (Flts, Missile Shot)		\$1,100		\$750		\$750		\$600		\$400		\$500					\$4,100	
Combine Performance/ECS Flights												\$900						
Maximize use of M&S								\$300									\$300	
King Air Flight Test (Refly Reduction)								\$200		\$100							\$700	
Schedule Acceleration								\$500		\$50							\$550	
Potential Savings Realized		\$1,100		\$750		\$750		\$5,300		\$4,480		\$2,750		\$500			\$15,630	
Affordability Trades Realized - Baseline																		
Affordability Trades Realized - Baseline		\$3,100		\$13,250		\$15,000		\$11,050		\$6,830		\$500				\$0	\$49,750	71.4%
Total Should Cost Savings								\$1,000		\$900		\$3,300		\$1,500			\$6,300	2.2%
Total Potential Savings		\$3,100		\$13,250		\$15,000		\$12,050		\$7,550		\$3,800		\$1,500		\$0	\$56,050	19.3%
Total Investment	\$0		\$0		\$0		\$0		\$0		\$0		\$0		\$0		\$0	
Should Cost Saving																		
Affordability Trade/Should Cost Already Realized																		
Investment																		
Excursion																		
Each opportunity has specific key measurements and trigger points defining when funding will be realized.																		

Each opportunity has specific key measurements and trigger points defining when funding will be realized.

Although savings from MYP contracts are often significant, it can take several years lead time to complete the statutory criteria (including preparing an ICE and documenting savings). Therefore, several programs have adopted an alternative approach variously referred to as Tandem/Bundle/Block Buys, whereby the government solicits option prices for multiple lots based on planned purchases without making the firm commitment to buy that is a feature of MYP contracts. Three of the MDAPs studied realized savings through this approach: E-2D, GMLRS, and Stryker. In these cases, the PMO engaged with the contractor to obtain pricing based not only on a stand-alone current year production lot, but also lower priced options contingent on the government purchasing additional units the following fiscal year. Savings for these programs ranged from 4–7 percent, which is less than that of an MYP contract (for which the threshold is generally 10 percent), but nevertheless significant considering such savings result solely from negotiating prices for multiple lots rather than just the current year's lot.

Of course, without MYP contract approval, the government cannot commit that it will purchase units the following year. So why would a company offer lower prices for units in the current year, effectively at its own risk, based on the PMO's desire (but not commitment) to buy more units the following year? A rationale was provided to the author by the industry PM for the E-2D program. Particularly in today's fiscally austere environment, it makes business sense for companies to lower their cost structure and offer their products at a competitive price, especially when it results in more stable demand for those products. This author has heard many industry leaders cite predictable demand and long-term business arrangements as top priorities for their customer relationships, even more than profit margin. It thus makes good business sense for companies to take advantage of expanded customer demand by reducing costs and improving operational efficiency through investments in new technologies, tooling, utilizing economic order quantities, and long-term supplier relationships, etc. It also makes sense for companies to share benefits of those lower costs with their customers, further cementing a mutually beneficial supplier-customer relationship.

Should Cost Analysis to Inform Negotiations Prior to Contract Award

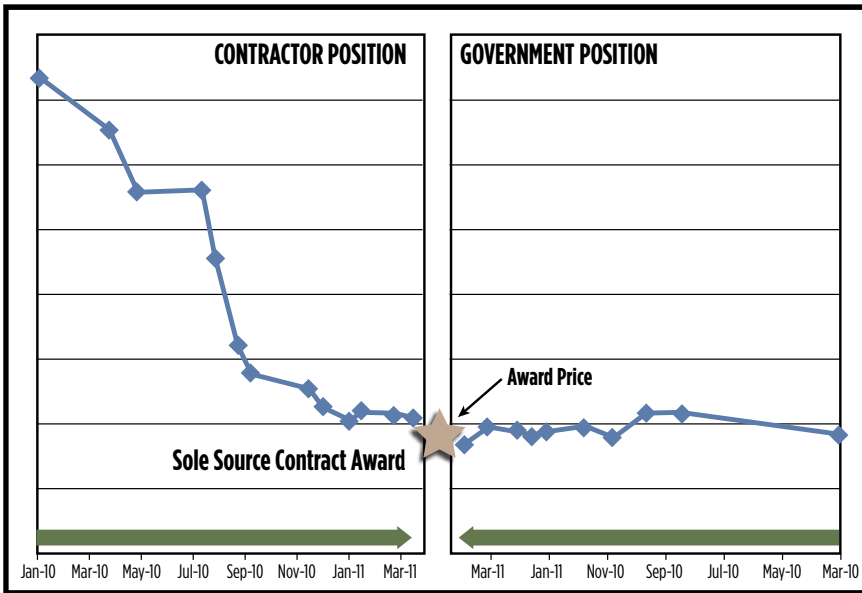
As previously mentioned, BBP Should Cost is meant to be simpler than FAR Should Cost as described in FAR Part 15.4 (General Services Administration et al., 2013), which is primarily designed to inform the government's negotiating position prior to contract award. However, conducting a FAR-type review is an acceptable Should Cost approach and may be appropriate for programs that are preparing for a major contract award. Four MDAPs in this study conducted such reviews: F-22, Evolved Expendable Launch Vehicle (EELV), Guided Missile Destroyer (DDG-51), and GMLRS. These reviews ranged in size and scope, from a 50-plus member team that reviewed contractor documents, facilities, and processes for over 6 months to support negotiations on a ~\$500 million contract, to a 6–8 person team that worked for 4–6 weeks to support a contract valued at less than \$100 million. Several PMs observed that the reviews were about more than just Should Cost—they also provided a technical evaluation of contractor proposals that was useful for source selection and contract negotiations. Air Force Colonel Greg Gutterman (2013), F-22 PM, said:

...as a result of this analysis we identified math errors, overly conservative assumptions, and other items which helped us negotiate a \$32M savings...I believe we've found a way to get a better business deal using our approach to the Should-Cost analysis. (p. 4)

The primary advantage of conducting a Should Cost review prior to contract award is that it provides critical knowledge to the government team, enabling it to negotiate smartly. The DDG-51 PMO had previously purchased over 60 ships from 1985 through 2005, so its PM had a very good understanding of the product's costs. However, the PMO team had not purchased a ship in 5 years and was confronted with a tough sole-source negotiating environment with their supplier. Conducting a thorough Should Cost analysis allowed the DDG-51 PMO team to ensure its understanding of costs and risks was appropriate. The ensuing negotiations, as depicted in Figure 4, were long and difficult, but ultimately saved the government hundreds of millions of dollars (compared to the company's opening bid). Obviously, not all PMs are in a position to negotiate a procurement action for so long—they might have to obtain support to shift their funding. However, in the case of DDG-51 the Should Cost analysis provided the government with enough confidence in its position

that the Defense Acquisition Executive (DAE) and SAE engaged with Congress to ensure the program's money was protected throughout the protracted negotiations.

FIGURE 4. PRICE CONVERGENCE DURING DDG-51 NEGOTIATIONS INFORMED BY SHOULD COST ANALYSIS



Schedule Reductions

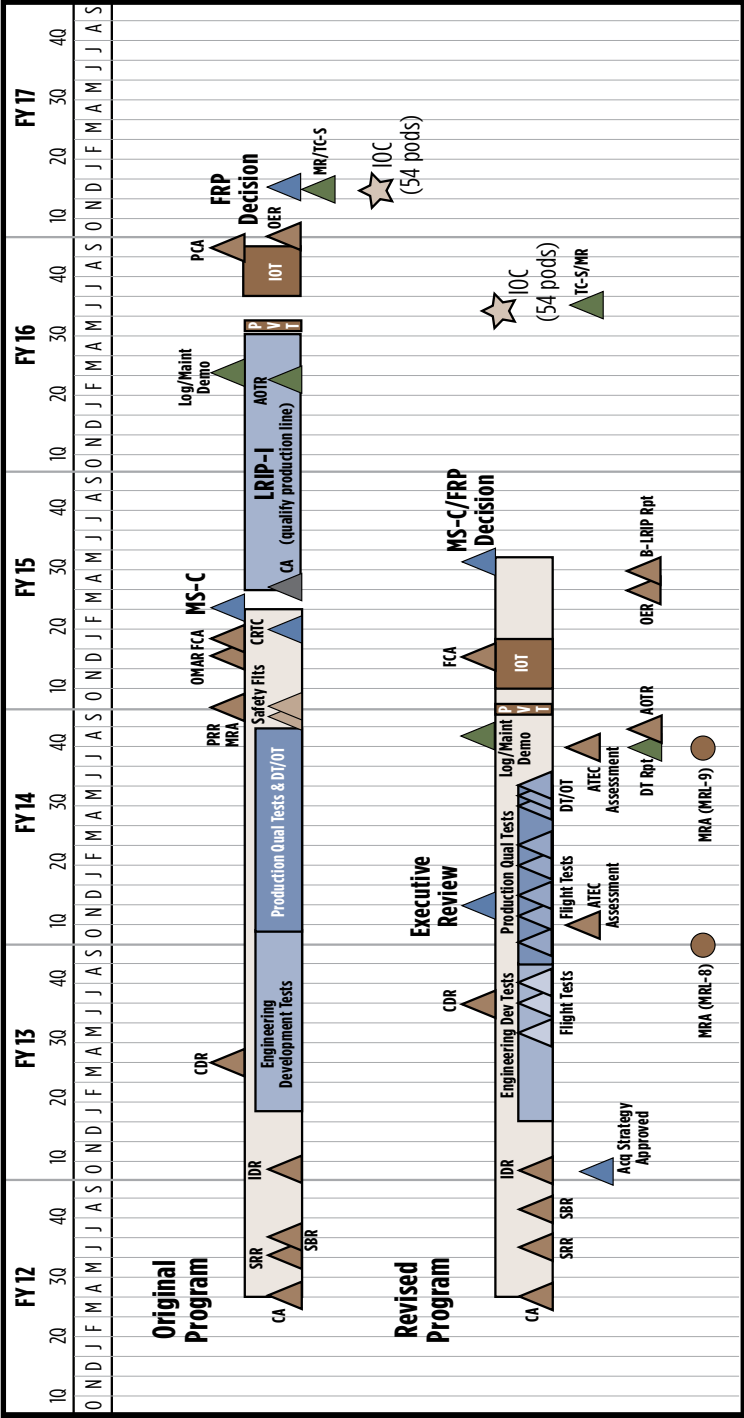
Several programs found savings by streamlining and shortening their schedule, including Apache, GMLRS, and AIM-9X. If work can be compressed at acceptable risk, reducing the program's schedule is a straightforward, commonsense approach to increase program efficiency and lower overall costs, because it shortens the time one must pay for facilities and the "standing army," i.e., the contractor and government personnel working on the program. Of course, such an approach must be applied carefully to ensure the revised schedule is realistic and does not create unintended consequences. It isn't enough to consider just the feasibility and risks of compressing the planned effort, (i.e., can the work be done faster?); numerous other issues must be assessed, such as feasibility of realigning funding to support an accelerated schedule (is money available earlier to save money later?), availability of personnel and/or facilities (can the test plan really be altered?), and interdependencies with other programs (will a sister program's subsystem be available to support the revised schedule?).

During their Should Cost effort, the GMLRS PMO carefully examined their entire planned effort, from MS B Contract Award to the Full-Rate Production (FRP) Decision, and reduced the original program schedule by 16 months (32 percent), as shown in Figure 5. Most of the reduction in the schedule resulted from the PMO's carefully considered decision to combine the MS C and FRP Decisions, based on their assessment that a mature production line would enable Initial Operational Test and Evaluation to precede MS C, obviating the need for an LRIP (Low Rate Initial Production) phase. Although eliminating LRIP might be only rarely applicable to other MDAPs, the GMLRS approach illustrates several positive features of a robust Should Cost review: "out of the box" thinking can yield significant savings, and the events and processes in Interim DoD Instruction 5000.02 (2013) are tailorable and should be streamlined based on a program's unique characteristics. Apart from eliminating LRIP, GMLRS also shortened its development schedule by using rockets from inventory to build test articles and, like Apache, through the DT/OT test efficiencies described previously. Schedule reductions can also be realized during production: Should Cost management enabled the AIM-9X contractor to reduce its missile build cycle from 12 to 8 months (i.e., 33 percent), in part through the PMO's timely award of the production contract in the first quarter of the fiscal year, which prevented a production gap. This is another illustration that significant savings can be achieved by prudent planning and prompt decision making and execution.

Accelerating Deliveries/More Efficiently Aligning Production

The accelerated production just described for AIM-9X led to schedule reductions. Three other programs—EELV, VIRGINIA-class submarine, and F-18—each implemented accelerated or better aligned production to achieve savings. For instance, EELV obtained Service and DAE approval of their long-range procurement plan that considers the combined needs of the Air Force and other DoD and federal agencies for rocket cores from FY13-17 and beyond. According to EELV's PM, obtaining option pricing based on this procurement plan allows EELV to get many of the benefits of an MYP contract without MYP authorization. Much like the Tandem/Bundle/Block Buys approach described earlier, providing contractors with coordinated procurement plans across the government (even without a firm commitment to buy), enables contractors to obtain subcontractor commitments and provides savings through more economical (or at least stabilized and predictable) order quantities.

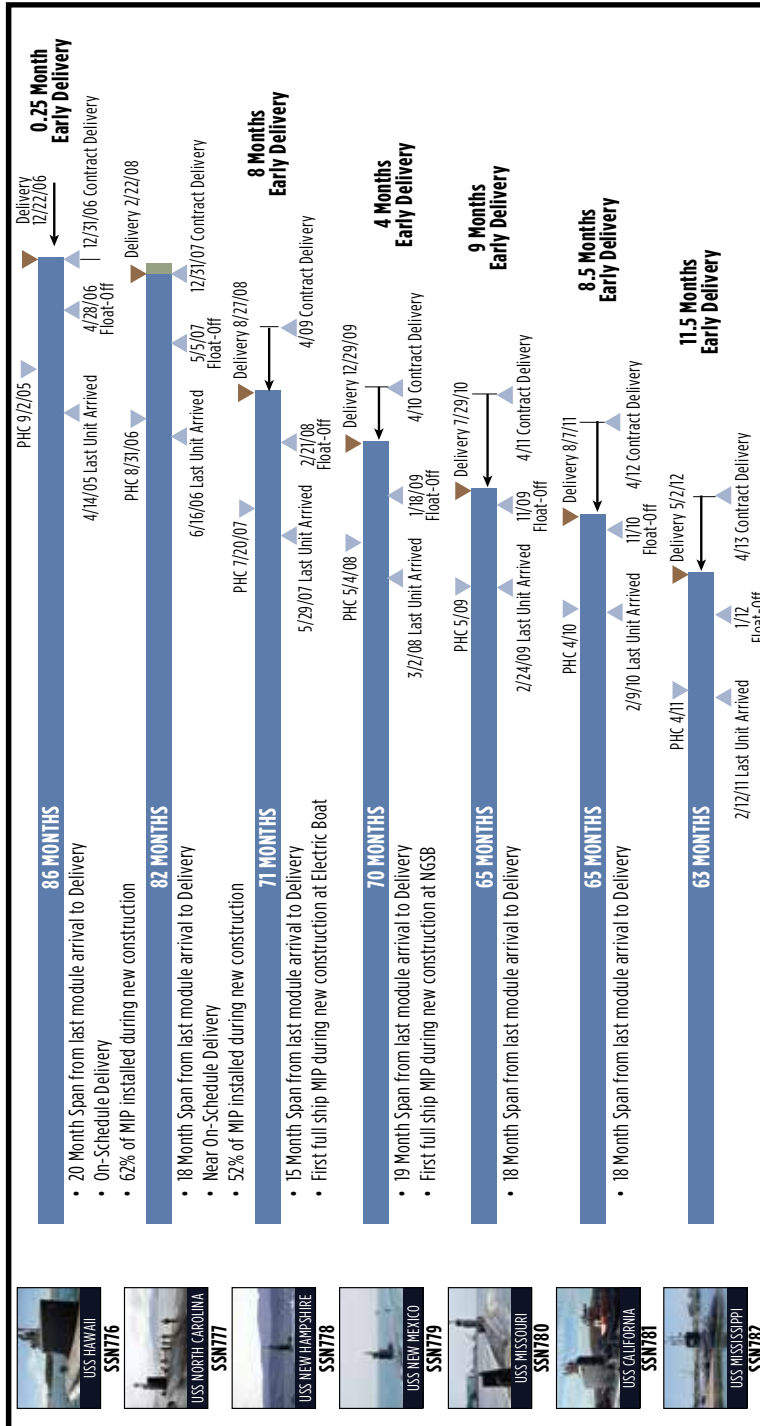
FIGURE 5. GMLRS REVISIONS TO PROGRAM SCHEDULE RESULTING FROM SHOULD COST ANALYSIS



The VIRGINIA-class submarine program has conducted an active Reduction in Total Ownership Cost (RTOC) program that has continuously implemented design improvements and production efficiencies since the lead submarine was delivered in 2004. Major cost reductions were achieved by changing from a 10- to a 4-module build plan, and through cost-reduction initiatives in countless systems and subsystems (e.g., propulsion, main machinery, damping systems, paint and coatings, and many others). A striking illustration of the VIRGINIA program's RTOC success is shown in Figure 6, which depicts schedule reductions achieved from SSN776 to SSN782 (the third through ninth units). The build time was reduced from 86 to 63 months, and every submarine except the fourth was delivered ahead of schedule. These cost reductions were accomplished in parallel with new designs that improve performance, such as addition of a new payload module that will accommodate larger missiles and other payload concepts.

Performance Based Logistics

The Should Cost approaches described thus far have been applicable to the investment phase of the life cycle. Recent studies have demonstrated that a Performance Based Logistics (PBL) contracting approach can yield demonstrated savings as well as improved performance outcomes in the Operations and Sustainment (O&S) phase (Boyce & Banghart, 2012). AH-64E Apache and the V-22 programs each realized significant cost savings through a PBL approach. According to the AH-64E PM, the PBL contract reduced spares in the pipeline and the amount of money required for the Working Capital Fund, resulting in savings of \$276 million compared to the AH-64E POM estimate of the amount spent over the same time frame, based on its previous logistics approach. Likewise, the V-22 implemented a comprehensive O&S cost and performance improvement program that reduced costs-per-flying-hour from 2010–2012 by 18 percent, while improving the mission-capable rate from 53 to 68 percent. In addition to implementing PBL contracts with its prime and engine manufacturer, the V-22 did a wholesale review of its O&S costs that reclassified 414 parts from consumable to repairable, established industry support for depot standup, technical assistance and field training, and implemented an executive-level government/contractor review of O&S requirements and strategy.

FIGURE 6. SCHEDULE REDUCTIONS ACHIEVED BY THE VIRGINIA-CLASS SUBMARINE PROGRAM

Creating a Competitive Environment

In discussing the best way to achieve desired performance at acceptable cost, many leaders stress the importance of creating a competitive environment. At DAU's 2011 Program Executive Officer/Systems Command (PEO/SYSCOM) Commanders' Conference, several SAEs expressed the view that where healthy competition exists, the resulting award is in essence a Should Cost target for the contract. Several programs in this study adopted program-specific approaches that maximized or leveraged competition to obtain advantageous prices that were below the government's Will Cost and/or POM position. Three such programs were the DDG-51, which maximized competition in its dual award to two technically qualified bidders through a Profit-Related-to-Offer (PRO) contracting strategy (Vandroff & Kimble, 2013); KC-46, which altered its Best Value competitive strategy between 2008 and 2011 to place a premium on price; and Littoral Combat Ship (LCS), which altered its competitive strategy from downselect to multiple awards based on affordable proposals received as a result of a robust competitive environment.

Closing Thoughts

The approaches described herein are just a few of many possibilities to reduce costs and improve efficiency through Should Cost management. Experienced acquisition professionals will recognize that most of the approaches described are not new, but require an abundance of strategic thinking and planning, and a long-term vision. Significant fiscal constraints are now reality, so Should Cost management is less viewed as a way for "someone to cut my program's budget," than a tool to protect a program from inevitable budget cuts. The philosophy expressed by Under Secretary of Defense for Acquisition, Technology and Logistics Frank Kendall, the current USD(AT&L), has consistently been that Should Cost is a way for programs to "beat the budget," so programs spend less than their ICE. That change alone would make an enormous difference in DoD's credibility with Congress and the American people, ending the DoD's long-standing pattern of emphasizing performance and capability above all, and accepting cost and schedule growth as inevitable.

Author Biography



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References

- Boyce, J., & Banghart, A. (2012, March-April). Performance based logistics and Project Proof Point: A study of PBL effectiveness. *Defense AT&L*, 41(2), 26–30.
- Carter, A. B. (2010a). *Better Buying Power: Guidance for obtaining greater efficiency and productivity in defense spending* [Memorandum]. Retrieved from: <http://bbp.dau.mil/docs/Better%20Buying%20Power-Guidance%20for%20Obtaining%20Greater%20Efficiency%20and%20Productivity%20in%20Defense%20Spending.pdf>
- Carter, A. B. (2010b). *Implementation directive for Better Buying Power—Obtaining greater efficiency and productivity in defense spending* [Memorandum]. Retrieved from: <http://bbp.dau.mil/docs/Implementation%20Directive%20for%20Better%20Buying%20Power%20--%20Restoring%20Affordability%20and%20Productivity%20in%20Defense%20Spending.pdf>
- Carter, A. B. (2011a). *Should-cost and affordability* [Memorandum]. Retrieved from <http://bbp.dau.mil/docs/Should-cost%20and%20Affordability.pdf>
- Carter, A. B. (2011b). *Implementation of will-cost and should-cost management* [Memorandum]. Retrieved from <http://bbp.dau.mil/docs/Joint%20Memorandum%20on%20Savings%20Realted%20to%20Should%20Cost.pdf>
- Carter, A. B., & Hale, R. (2011). *Joint memorandum on savings related to “should-cost.”* Retrieved from <http://bbp.dau.mil/docs/Joint%20Memorandum%20on%20Savings%20Realted%20to%20Should%20Cost.pdf>
- Carter, A. B., & Mueller, J. (2011, September-October). Should cost management: Why? How? *Defense AT&L*, 40(5), 14–18.
- Department of Defense. (2013). *Operation of the defense acquisition system*. Interim DoD Instruction 5000.02. Washington, DC: Office of the Deputy Secretary of Defense.
- Guterman, G. (2013). Leadership Interview with Col Greg Guterman. *The PM Gazette*, 3(3), 1–4. Retrieved from: <https://www.my.af.mil/USAF/AFP40/d/s6925EC13430A0FB5E044080020E329A9/Files/PM%20Gazette%20April%202013%20FINAL.PDF>
- General Services Administration, Department of Defense, & National Aeronautics & Space Administration. (2005). *Federal Acquisition Regulation*. Washington, DC: General Services Administration Regulatory Secretariat Division.
- Husband, M., & Mueller, J. (2012, November-December). Should cost management tactics. *Defense AT&L*, 41(6), 11–15.
- Multiyear Contracts: Acquisition of Property, 10 U.S.C. § 2306b, 2011.
- National Defense Authorization Act for Fiscal Year 2011, 10 U.S.C., Pub. L. 111-383, 2011.
- O'Rourke, R., & Schwartz, M. (2013). *Multiyear procurement (MYP) and block buy contracting in defense acquisition: Background and issues for Congress*. CRS Report No. R41909. Washington, DC: Congressional Research Service.

Parker, W. (2011). *Program managers tool kit*, 16th ed. Retrieved from <https://pmtoolkit.dau.mil/>

Vandroff, M., & Kimble, R. (2013). Navy raises the bar. *Defense AT&L*, 42(5), 17-19.

Endnotes

- 1
 1. Scrutinize every element of program cost.
 2. Look for savings in repetitive activities.
 3. Leverage learning curves.
 4. Examine overhead and indirect costs.
 5. Incentivize your contractor on cost savings.
- 2
 1. Scrutinize each contributing ingredient of program cost and justify it. Why is it as reported or negotiated? What reasonable measures might reduce it?
 2. Particularly challenge the basis for indirect costs in contractor proposals.
 3. Track recent program cost, schedule and performance trends, and identify ways to reverse negative trend(s).
 4. Benchmark against similar DoD programs and commercial analogues (where possible), and against other programs performed by the same contractor or in the same facilities.
 5. Promote Supply Chain Management to encourage competition and incentivize cost performance at lower tiers.
 6. Promote.
 7. Identify opportunities to break out Government-Furnished Equipment versus prime contractor-provided items.
 8. Identify items or services contracted through a second- or third-party vehicle. Eliminate unnecessary pass-through costs by considering other contracting options.
9. In the area of test:
 - a. Take full advantage of integrated Developmental and Operational Testing to reduce overall cost of testing; and
 - b. Integrate modeling and simulation into the test construct to reduce overall costs and ensure optimal use of national test facilities and ranges.
10. Identify an alternative technology/material that can potentially reduce development or life-cycle costs for a program. Ensure the prime product contract includes the development of this technology/material at the right time.
- 3 The first is through a bottoms-up estimate...The second method is to identify reductions from "Will-Cost" estimates...A third method, where applicable, should use competitive contracting and contract negotiations to identify Should-Cost savings.
- 4 <https://acc.dau.mil/april13htf> — URL for video and presentation slides from DAU's Better Buying Power Hot Topics Forum presentation held on April 9, 2013.

APPENDIX

List of Abbreviations and Acronyms

ACAT	Acquisition Category	Dev	Development
Acq	Acquisition	DoD	Department of Defense
AIM	Air Intercept Missile	DT/OT	Developmental Testing/ Operational Testing
AOTD	Active Optical Target Detector	ECS	Electronic Concealment System
AOTD-STE/TE	Active Optical Target Detector-Special Test Equipment/Test and Evaluation	EELV	Evolved Expendable Launch Vehicle
AOTR	Assessment of Operational Test Readiness	ELCAN AOTD	ELCAN Optical Technologies (Division of Raytheon Company)
ASA/ALT	Assistant Secretary of the Army for Acquisition, Logistics and Technology	EMD	Engineering, Manufacturing and Development
ATEC	U.S. Army Test and Evaluation Command	ERB	Engineering Review Board
AUR	All Up Round	EU	European Union
BBP	Better Buying Power	FACO	Final Assembly and Check Out
B-LRIP	Beyond-Low Rate Initial Production	FAR	Federal Acquisition Regulation
CA	Contract Award	FCA	Functional Configuration Audit
CAP	Combined Aggregate Program	Flts	Flights
CAPE	Cost Assessment and Program Evaluation	FMS	Foreign Military Sales
CAS	Control Actuation Section	FPIF	Fixed Price Incentive (Firm Target)
CATM	Captive Air Training Missile	FRP	Full Rate Production
CATM BIT	Captive Air Training Missile Built-In Test	FY	Fiscal Year
CCB	Configuration Control Board	GFX	Government Furnished Equipment
CDR	Commander	GMLRS	Guided Multiple Launch Rocket System
CDRL	Contract Deliverables Requirements List	Gov	Government
CLS	Contractor Logistics Support	GPS	Global Positioning System
COTS/GOTS	Commercial-Off-The- Shelf/Government Off-the-Shelf	GSIL	Ground Segment Integration Lab
CPI	Continuous Process Improvement	HUMINT	Human Intelligence
CRTC	Cold Regions Testing Center	HW	Hardware
DAE	Defense Acquisition Executive	HW ECP	Hardware Engineering Change Proposal
DAU	Defense Acquisition University	IAMD	Integrated Air and Missile Defense
DDG	Guided Missile Destroyer	IBCS COMMS	Integrated Battlefield Control System, Communications Management System
Demo	Demonstration		

ICE	Independent Cost Estimate	OSD	Office of the Secretary of Defense
IDR	Interim Design Review	P&F	Plug and Fight
IFC	Integrated Fire Control	PBL	Performance Based Logistics
IFCN	Integrated Fire Control Network	PCA	Physical Configuration Audit
IMU	Inertial Measurement Unit	PEO/SYSCOM	Program Executive Officer/Systems Command
IOC	Initial Operational Capability	PHC	Pressure Hull Complete
IOT	Initial Operational Testing	PM	Program Manager
IRST	Infrared Search and Track	PMO	Program Management Office
LCS	Littoral Combat Ship	POA&M	Plan of Action and Milestones
LOG	Logistics	POM	Program Objective Memorandum
LRIP	Low Rate Initial Production	POP	Period of Performance
LRIP-I	LRIP Lot 1	PRO	Profit-Related-to-Offer
Maint	Maintenance	PRR	Performance Readiness Review
MDAP	Major Defense Acquisition Program	Qual	Quality
M&S	Modeling and Simulation	Rpt	Report
MIP	Material in Process	RTOC	Reduction in Total Ownership Cost
MOS	Mean Opinion Score	SAE	Service Acquisition Executive
MR	Manufacturing Readiness	SBR	System Baseline Review
MRA	Manufacturing Readiness Assessment	SEPM	Systems Engineering and Program Management
MRL	Manufacturing Readiness Level	SI	Systems Integration
MS	Milestone	SNAP	Simplified Nonstandard Item Acquisition Program
MYP	Multiyear Procurement	SP	Start Pulse
NCOC	Nano-Composite Optical Ceramics	Spec	Specification
NIPR	Non-Classified Internet Protocol	SRR	Software Readiness Review
NGSB	Northrup Grumman Shipbuilding	TCM	TRADOC Capabilities Manager
nLight	nLight Corporation (Vancouver, WA)	TC-S	Trajectory Correction System
NSP	Not Separately Priced	TDP	Technology Development Phase
O&S	Operations and Sustainment	TRADOC	U.S. Army Training and Doctrine Command
OEM	Original Equipment Manufacturer	USD(AT&L)	Under Secretary of Defense (Acquisition, Technology and Logistics)
OER	Operational Test Agency Evaluation Report	USG	United States Government
OMAR	Operational Test Agency Milestone Assessment Report		