



DEFENSE ACQUISITION UNIVERSITY
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February 2011

TEACHING NOTE

COST AS AN INDEPENDENT VARIABLE (CAIV)

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INTRODUCTION

CAIV is basically an acquisition process intended to integrate proven successful business-related practices with promising new DoD initiatives to obtain superior, yet reasonably priced, warfighting capabilities. Traditionally, the success of acquisition programs has been judged by their accomplishments with respect to three parameters: *cost, schedule and performance*. Of these, performance usually received the most emphasis, and, therefore, was treated as a "fixed" or "independent" variable. Schedule and cost were allowed to vary to achieve some desired level of performance. In an era of shrinking defense budgets, DoD has adopted the CAIV philosophy of treating *cost* as the independent variable of the three, thereby allowing performance and schedule to vary somewhat in an attempt to keep weapon systems affordable.

IMPLEMENTATION OF CAIV

In a USD (AT&L) letter dated 19 Jan 02, Secretary Aldridge [USD (AT&L)] required all ACAT I programs to:

“incorporate a CAIV plan and to have an evolutionary acquisition or spiral development implementation plan in place” by the end of September 2002. Guidelines developed by The Reduction in Total Ownership Cost (RTOC) working group are “intended as general guidelines to assist the process, but not constrain it.”

As stated in DoD Directive 5000.01 (certified current as of 20 Nov 2007), all participants in the acquisition system are expected to recognize the reality of fiscal constraints and to view cost as an independent variable. Cost in this context refers to life cycle cost, which should be treated as equally important to performance and schedule in program decisions. To institutionalize this principle, each program manager should consider developing a formal Cost As an Independent Variable (CAIV) plan as part of that program’s acquisition strategy.

As an essential element in a CAIV plan, a Cost/Performance IPT (CPIPT) for that program would monitor the CAIV implementation and oversee trade studies. The CPIPT will normally be led by the Program Manager (PM) or the PM's representative, and include representation from the user, costing, analysis, and budgeting communities as a minimum. The CPIPT may also include representation from industry, if the program's stage of development and relevant laws permit it.

Once an Initial Capabilities Document (ICD) has been approved, a CAIV strategy will be formulated as part of the acquisition strategy to set cost objectives. By program initiation, the

PM shall have established life-cycle cost or total ownership cost objectives for the program, including objectives for Research and Development cost, Procurement cost, Military Construction cost, Operating and Support cost, and Disposal cost as well as unitized cost objectives such as Program Acquisition Unit Cost and Average Procurement Unit Cost. *[Note: Description of these cost categories is included in the Teaching Notes entitled "Introduction to Cost Analysis" and "Oversight of Major Acquisition Programs"]*. At each subsequent milestone review, the PM will reassess these cost objectives and the progress made toward achieving them.

The CAIV process recognizes that the best time to reduce life-cycle costs is early in the acquisition process (e.g., it makes sense for the PM to spend development funds in order to save a greater amount of production costs and/or operating and support costs later). However, in order to have CAIV implemented early in the life cycle, the acquisition and using communities must coordinate early and closely. Constant feedback must be supplied from the cost CPIPT to the using command on the impacts of various designs.

Ideally, cost/performance tradeoff analyses should be conducted before an acquisition approach is finalized. Therefore, the CPIPT plays a key role in assessing tradeoffs and recommending to the PM performance or engineering and design changes that reduce or maintain cost without causing breaches of the thresholds specified in the approved capabilities documents and the Acquisition Program Baseline (APB). Within the "trade space" between the threshold and the objective of the program's Key Performance Parameters (KPPs), the PM is empowered to act on these recommendations without additional permission from higher levels. If the CPIPT identifies tradeoffs that would cause a breach of the capabilities documents or APB, the leader of the CPIPT must notify both the PM and the OIPT leader. The PM is then responsible to bring the proposed changes to the attention of both the Milestone Decision Authority (MDA) and the capabilities document approval authorities for final decision.

One of the keys to making CAIV work is to provide incentives (and remove disincentives) to both government and contractor personnel. For example, to provide incentives to the contractor, CAIV savings should be shared equitably between the government and the contractor. Permitting the PM to retain at least some internally generated savings within the program, perhaps for use on program enhancements, further cost reduction efforts, or to improve operations of the program office would provide incentives for Government PMs. For government personnel (both civilian and military), there should be provisions for awards to individuals and groups for notable contributions to achieving cost reductions. An example of removing disincentives to cost savings efforts concerns perception of "failed" efforts. The chain of command should be willing to accept risk-taking when the potential for future payoff is high. Managers who take the risk and work hard in that risky environment should not be penalized for their less-successful attempts at cost savings if their efforts fail for reasons beyond their control.

CAIV AND ACQUISITION REFORM

CAIV is not only an acquisition reform itself but is also a collection of other acquisition reforms. To accomplish the CAIV goal of reducing system life-cycle cost, many individual acquisition reform initiatives may be employed. A partial list of these initiatives includes using commercial standards and processes; commercial or non-developmental components;

commercial best practices; performance capability specifications; and contracting strategy techniques that will allow sharing of cost savings with contractors who bring in the program at or below previously established aggressive cost objectives. Another example of an acquisition reform initiative that contributes to the accomplishment of CAIV is the Single Process Initiative (SPI). Under SPI, a contractor is allowed to use a single process within his own facilities to manage and report on all defense contracts (rather than having multiple different processes and reports called for in each separate contract), thereby reducing management and overhead costs for each contract.

Although some initiatives may require a waiver from current statute(s), acquisition reform philosophy encourages PMs to seek such waivers to reduce program costs.

DIFFERENCES BETWEEN CAIV AND DTC

Some veterans of defense acquisition may interpret CAIV as another name for the *Design to Cost (DTC)* concept. Although the two are similar in many ways, there are significant differences. Probably the biggest difference between DTC and CAIV is in the focus of the two concepts. Under DTC, the focus tended to be on designing the system to minimize development and production costs for a particular performance level. Under CAIV, performance (and schedule) can be traded to achieve cost goals. Under DTC, little or no attention was given to reducing post-production operating and support (O&S) costs, while under CAIV, the focus is on life-cycle cost as a whole. Thus, production cost might actually increase under CAIV if the use of more expensive materials or more precise manufacturing processes would result in greater reductions of maintenance or operating costs in the O&S phase.

Another key difference between DTC and CAIV is in the use of the CPIPT to recommend tradeoffs. Under DTC, the PM was largely alone in making decisions regarding trades to reduce production cost. Under CAIV, the users are intimately involved in making trade recommendations as a result of their participation on the CPIPT.

CAIV SUCCESSES

Since its inception, acquisition programs have had varying successes in implementing CAIV. One of the key successes attributable to implementing the basic CAIV philosophy is that of reducing total ownership costs (R-TOC). In fact, the two terms, CAIV and R-TOC, have almost become synonymous. Another success is almost transparent: the trade-offs done by program managers to stay within established cost objectives. While not always “news-worthy” this has helped keep costs under better control. Some specific success stories can be found in the IDA website listed below.

SUMMARY

CAIV is an acquisition philosophy that emphasizes keeping system life cycle cost within an established range by trading the other system acquisition variables of performance or schedule. Since a significant portion of a system’s life cycle cost is fixed by its design, the optimum time to apply CAIV principles is early in the life of an acquisition program. The PM has authority to make some changes within the “trade space” between the thresholds and objectives documented

in the capability needs document provided the change does not result in a KPP being reduced below its threshold value.

ADDITIONAL CAIV RESOURCES

This teaching note presents just a summary of the CAIV concept. For those seeking additional information on the subject, the following resources are highly recommended:

- **Defense Acquisition Guidebook (DAG)** at <https://dag.dau.mil/Pages/Default.aspx> provides members of the defense acquisition community and industry with an interactive, on-line reference to acquisition policy and discretionary best practices. It contains guidance on various acquisition topics, to include CAIV. Following publication of the revised DoDI 5000.02 in December 2008, the DAG was taken off-line for updating and revision. The updated and fully interactive DAG was officially activated 17 December 2009.
- **AT&L Knowledge Sharing System** at <http://akss.dau.mil/jsp/default.jsp> is an electronic knowledge presentation system that provides current acquisition policy and guidance for all DoD Services and Agencies.
- For good, basic information about the CAIV program, you may want to visit the following websites:
 - The Department of the Navy “**DON Acquisition One Source**” website at http://acquisition.navy.mil/rda/home/acquisition_one_source.
 - The Institute for Defense Analyses (IDA) organization website at <http://ve.ida.org/rtoc/open/caiv.html>. This website also provides specific information on several “special interest” Defense acquisition programs that have used the CAIV principles in program execution.